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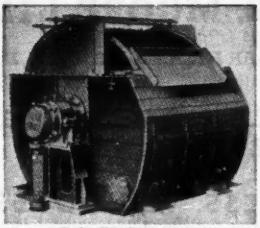

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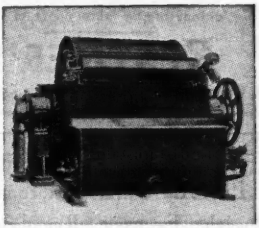

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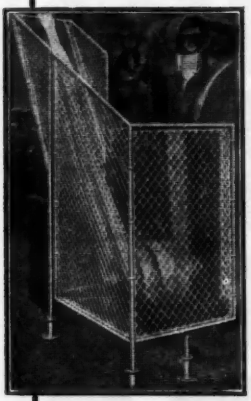

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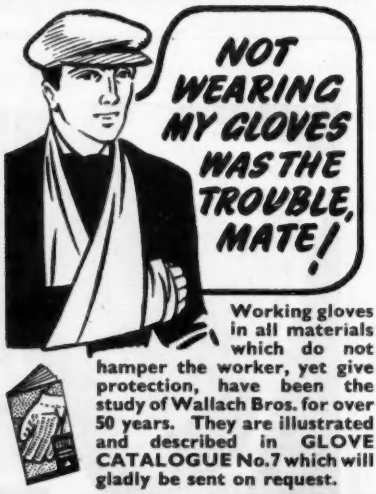

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INDEX TO ADVERTISERS
IN THIS ISSUE

	Page
Albright & Wilson, Ltd.	xi
Attwater & Sons, Ltd.	Cover ii
Black, B., & Son, Ltd.	xxii
Blackwell's Metallurgical Works, Ltd.	404
Bolton & Hayes, Ltd.	Cover iii
British Drug Houses, Ltd., The	404
British Steam Specialties, Ltd.	Cover ii
Brummer, J.	ix
Burgess Zeolite Co., Ltd.	xxi
Cannon Iron Foundries, Ltd.	vii
Castle Engineering Co. (Nott.), Ltd., The	Cover iv
Chance Brothers, Ltd.	x
Classified Advertisements	xviii, xix, xx, xxi & xxii
Collacott, R. A., & Partners	xxii
Collie, J. H., & Co., Ltd.	xxii
Donkin, Bryan, Co., Ltd., The	Cover iv
Everett, Edgecumbe, Ltd.	xiv
First Aid Supply Co.	ii
Foster Yates & Thom., Ltd.	xvii
Four Oaks Spraying Machine Co., The	Cover iii
Glebe Mines, Ltd.	xiv
Harris, Francis W., & Co., Ltd.	ii
Hill-Jones, Thomas, Ltd.	xii
Houchin, Ltd.	Cover iii
Howards & Sons, Ltd.	Front Cover
Jenkins, Robert, & Co., Ltd.	xvi
Jenkinson, W. G., Ltd.	xxi
Kestner Evaporator & Engineering Co., Ltd.	ii & xii
Kilner, John, & Sons (1927), Ltd.	404
Klinger, Richard, Ltd.	403
Lennox Foundry Co., Ltd.	xxii
Lodge-Cottrell, Ltd.	xvi
Lusty, W., & Sons, Ltd.	iii
May & Baker, Ltd.	iv
Moore, W., & E., Ltd.	ii
Organic Dyestuffs, Ltd.	xvii
Orr, Geo. W., & Co., Ltd.	xvii
Penrhyn Quarry	404
Permutit Co., Ltd., The	viii
Potter, F. W., & Soar, Ltd.	ii
Rozalex, Ltd.	Cover iii
Shell Chemicals, Ltd.	vi
Sutcliffe, Speakman & Co., Ltd.	xiii
Todd Bros. (St. Helens & Widnes), Ltd.	i
Tyrer, Thomas & Co., Ltd.	xv
Unifloc Reagents, Ltd.	i
Wallach Bros., Ltd.	ii
Wells, A. C., & Co., Ltd.	Cover ii
Widnes Foundry & Engineering Co., Ltd.	v
Worthington-Simpson, Ltd.	vii

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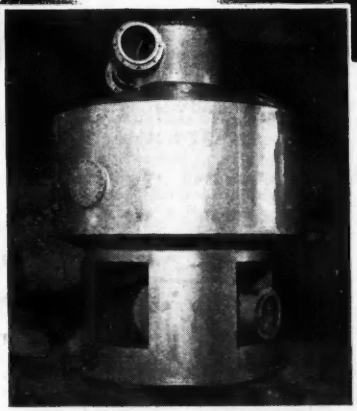

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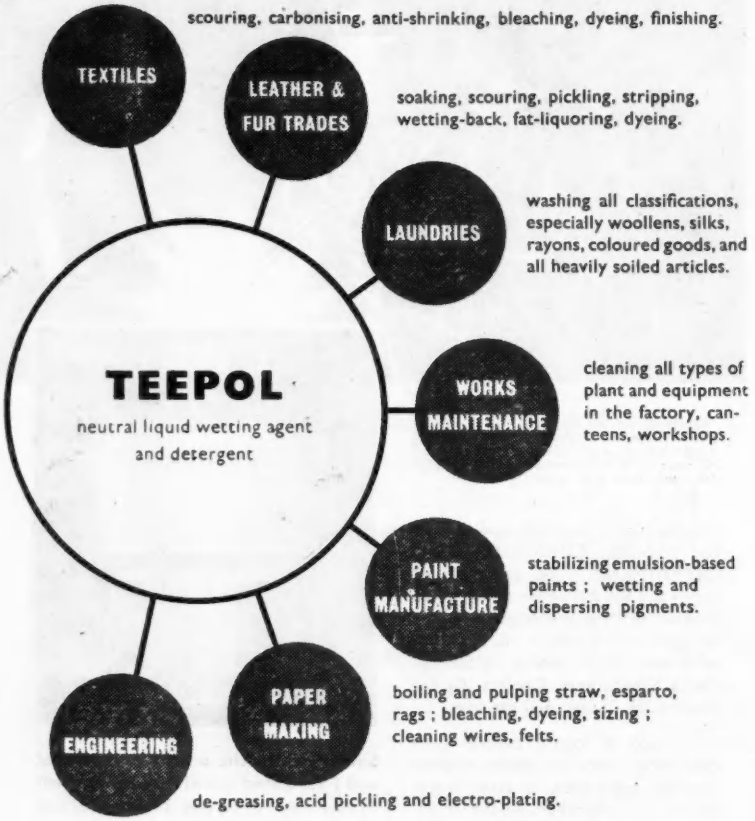
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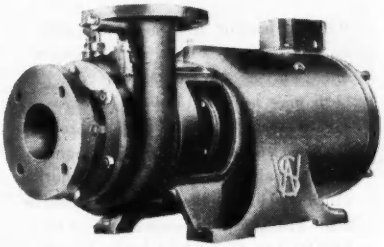

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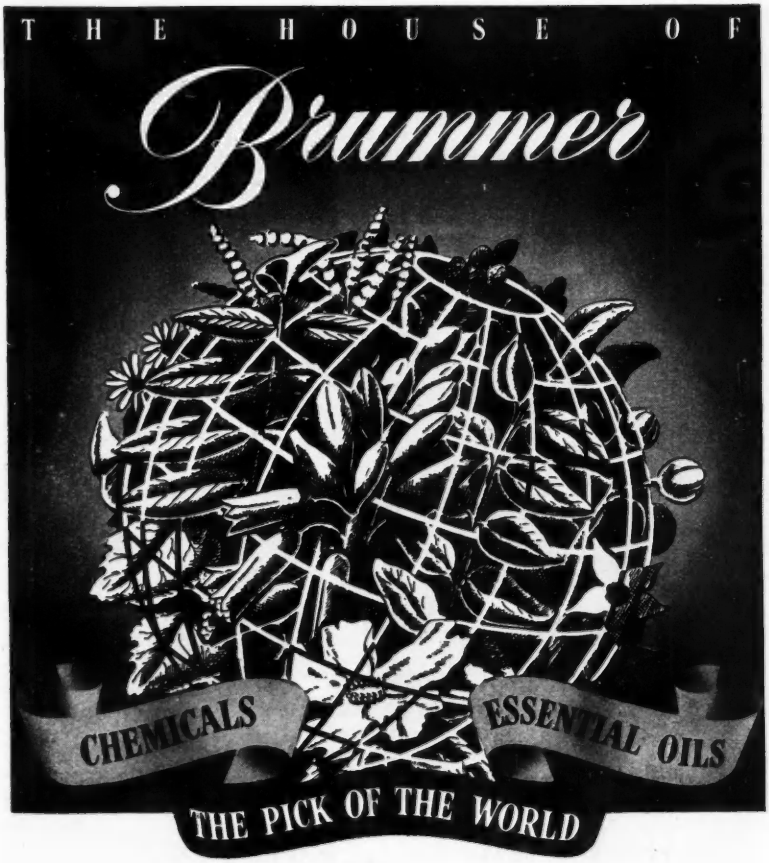

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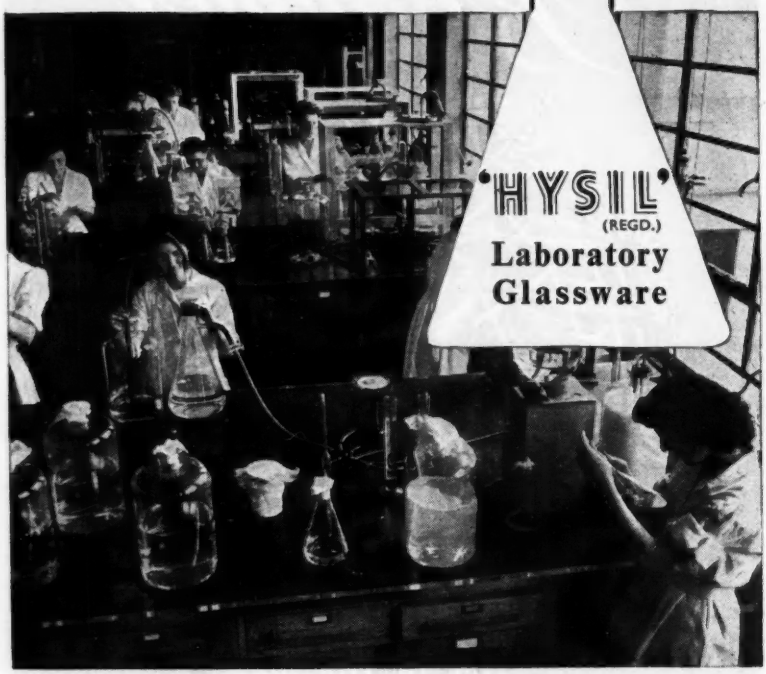

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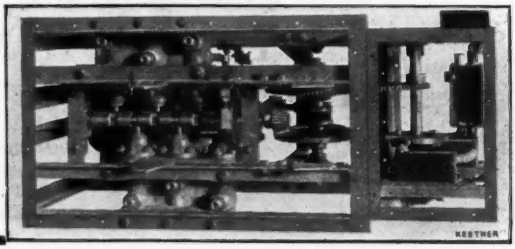

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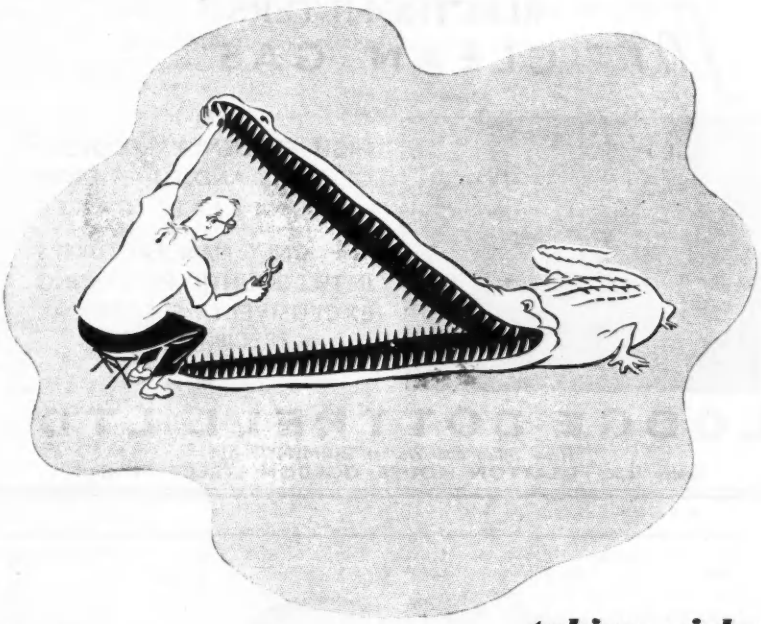

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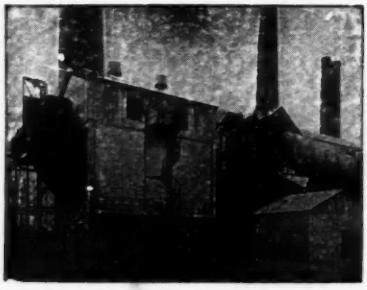

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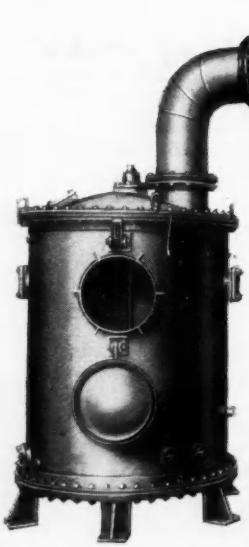

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VOL. LIX No. 1523. 18 September 1948 Annual Subscription 26s. 8d. per copy, post paid, 10d.

Why Work?

THE marked preference exhibited in so many quarters just now for using euphemisms, or at the least abstractions, in public discussion of the harsh facts of national recovery seems to be something more than a coincidence. Even the Chancellor of the Exchequer, it will be recalled, lately telling the Trades Union Congress more bluntly than almost any of his colleagues would care to do that harder work or more of it was the only means of attaining a fuller scale of living, had to resort to the now aged analogy of dividing the cake. It is almost axiomatic that generalisations of the sort which abound when the question of getting more work done is discussed on a national level are taken to apply to everybody—and to nobody in particular. It is, then, not altogether surprising when there is no recognisable response such as can be evoked by presenting an incentive in terms of £.s.d.

Nearly every chemical employer nowadays appears to have a clearer grasp of the problem of getting more work done cheerfully than has almost any member of the Government, and the organisations promoting this which have been built up within many of the large chemical undertakings are extraordinarily effective. In striking contrast, half the measures applied at Government level, from which come most of the exhortations to work harder, act as powerful "disincentives."

The most conspicuous example is, of course, the retention of a scale of income tax which is almost penal. The man who lately worked over the week-end on an urgent repair job, earning £4, from which 30s. was deducted as tax, expressed, when he received his pay the philosophy which thousands are adopting—"Never again." The financial incentive to hard work has been removed or reduced materially for all sections of the community. The business men, the executives, know that only by hard work can we retain even our present somewhat attentuated standard of living. These men may have no incentive in the shape of increased income (since the State extracts much from whatever they may earn, sometimes at the rate of 19s. 6d. in the £), but they have the incentives of personal achievement and the knowledge of the penalties of failure. The workman, for all the assurances of his trades union leaders that he is fit to sit on boards of directors, is seldom gifted with as clear a conception of what is at stake. People as a whole need something more tangible, as, for example, a military defeat with imminent invasion to arouse an equivalent devotion to the job in hand.

We have been told that Sir Stafford Cripps has now concluded that his "work more" propaganda campaign has not been a success. Of course it has not. Everyone, from bottom to top, has had a surfeit of propaganda. Some very good and obvious reason must be given for hard work, some carrot must be put before the donkey's nose. World economics is cer-

On Other Pages

Leader:
Why Work? 371
Notes and Comments:
Ending Waste 373
Atomic Standards Bureau ... 373
Technology Undeveloped ... 373
Careers in the Far East ... 374
Radioactive Elements 374
Rising Chemical Totals 375
U.S. Production Continues to Increase 375
Radioactive Isotopes 375
Dust in Industry 376
Specialised Photography 376
Metal and Mining Conference ... 376
Ceramic Congress 376
German Plant "Reprieved" ... 377
Dutch-German Agreement ... 377
Letter to the Editor 377
Continuous Fertiliser 378
A New Fungicide 378
Paper from Straw 378
Effects of Atom Bomb 378
U.K. Coal Research 379
Continental Shale Oil 379
Steel Supplies for Industry ... 380
Steel Defence Campaign 380
Another Record Broken 380
Science and World Affairs ... 381
German Analytical Practice ... 384
Conservation of Vital Materials ... 385
Electrodeposition Principles in Analysis 386
British Exhibition in Copenhagen ... 390
A New Glass Pump 395
Chemical Trade Prospects in Pakistan 398
Fertilisers in Italy 398
Pyrethrum Experiment 398
Nitroglycerine Explosion 400

tainly not the working man's carrot. Until the Government reduces its expenditure and relieves the tax burden so that incentives can again appear, there will be no general return to hard work, nor even to a fair day's work.

This aspect of the problem of production may be regarded by some as having limited application. Most jobs are not to be rated on "contract price" terms, which are the most effective means of getting work done quickly. What of the factory or chemical works in which the only possible method of payment is a weekly wage plus overtime? Here the financial incentive operates too, but it need not be the only one. The gas industry seemed to have found the means to contentment and hard work through the co-partnership movement. A short-sighted Government proposes to abolish this principle under nationalisation. Trades union leaders are asking that the workers should be given a share in management; co-partnership is an ideal way of doing this and of providing incentives in the form of dividends for successful work.

Politicians now demand more and more frequently that the worker should be consulted by his employers on production matters. There is psychological value, at least, in this suggestion. We all like to think we are important, and to be consulted in regard to our work provides a wonderful fillip. The system of setting up works production committees in which the proposals of the workers can be brought to the notice of the management, with joint planning of factory routine, has much to commend it. The workers in a factory know a great deal about their jobs, and can provide much criticism that is of value. Let them do so. That is one way to contentment, as well as economies. But to maintain, as some now do, that those who work at the bench, or operate the processes in the works, have sufficient knowledge and background required to shape successful industrial policy is patently absurd.

The problem of getting the rate of production we need is primarily a problem of incentive, and it is as well to recognise at once that the goods must first be delivered. The miners, it will be noted, seem to have secured all that they have sought for years; but the introduction of machinery, which should lead to greater output, seems to have produced little practical benefit to any but the miners. In proportion to the extra work done by the machine, the workers have done less; that is all we have achieved. It is hard to evade the unpleasant conclusion that for many the only infallible incentive is fear of losing one's job? If finally we prove to be unable to match America's production per man-shift until we have a million unemployed there will be no cake or talk of cakes. That fact cannot be disguised much longer.

NOTES AND COMMENTS

Ending Waste

IF the full development of science and a balanced world economy could be assured by the exchange of ideas alone the distinguished gatherings convened in Brighton by the British Association from September 8 to 15 should have solved a host of problems. None of the many leaders in the various branches of science who participated, has, however, suggested that amelioration in any sphere is likely to be produced by scientific means alone, much less by intellectual exercises, and few have failed to stress that the grossly wasteful industrial and scientific economy of the past still has lineal successors in present-day practices—the prodigal use of aluminium and the free emission of sulphur were among the examples quoted—and that such unimaginative policy, especially in the realm of food supplies, may call down a fearful penalty. This awareness that, in the long view, virtually nothing is inexhaustible is comparatively a new conception which scientists have a duty to make known as widely and as quickly as they can. Early discussions of the venerable British Association, whose background the president, Sir Henry Tizard, so realistically recalled, would have dismissed the idea with derision. Whether in the U.S.A. even now much attention would be paid to the doctrine of conservation, except perhaps in regard to mineral oil, is extremely doubtful. To that extent this country has learned under the impact of many scarcities a lesson which it has a duty to impart to others before the bottom is reached in some of the great natural storehouses of the world.

Atomic Standards Bureau

ONE hundred research institutes in 15 countries are stated now to be making reports to the U.S.A. on the results accruing from the use in their own science departments of the radioactive isotopes derived from the atomic energy laboratories at Oak Ridge, Tennessee, which were until comparatively recently the only source of these important new tools of investigation in many fields. The United Kingdom, which is still shown in the American returns as one of the 21 recipients around the world, now fortunately has an increasingly useful source of its own supply at the AER Establishment, Harwell, which, it is hoped, may before long be able to confer the same sort of benefits over a similarly wide field and reap corresponding advantages from foreign research. Meanwhile, the U.S.A. has clearly gained a handsome start in this department of science. One index of this is the news from Washington that the U.S. Atomic Energy Commission is building now in New Jersey an atomic standards bureau, with laboratories costing about £250,000, to ensure that the radioactive products now being more and more widely distributed in America, and soon to industry as well as to science, do not fall below the high standards achieved at the start. Here some 65 scientists will be employed, unproductively but no less usefully than any in the AEC establishment, ensuring that the materials produced for and in the atomic furnaces, such as uranium, radioisotopes, chemical compounds and equipment, are of the highest purity and quality attainable under present conditions. Thus research and use of the new radioactive aids in America gain a watchdog comparable with the older U.S. Bureau of Standards in Washington, to which their science and industry alike owe a great debt.

Technology Undeveloped

DESPITE the welcome acceleration in the tempo of atomic development revealed during the course of this year, the widespread use of the newer forms of radioactive material is fairly certainly not to be expected for some years, at least. Very few indeed are competent to forecast when those powerful influences will begin to have their effect on industry and science in this country, and those few are, under present prohibitions, not the most communicative. Because of that uncertainty and continuing secrecy the number who can be trained in the principles which will enable them to carry on the great work must be extremely small, notwithstanding the gradual widening of the facilities being provided at Harwell. Even fewer, unfortunately, are those who are being equipped with the technology which may suddenly be needed on a wide scale to take full

advantage of the gifts which radioactive elements could confer in the chemical and metal industries alone. In that connection, too, the U.S.A. looks like enjoying an enviable advantage in possessing a fairly large body of industrial scientists who were associated with the atom bomb project and are qualified to interpret their knowledge into terms of industrial use. Typically, some of these already are advertising the industrial services they are prepared to offer, although at the moment that stage has not been reached even there.

Careers in the Far East

NEARLY all the chemical and food industries and a good many of the metal enterprises here and elsewhere in Europe are still handicapped by the small scale of the revival of essential raw or semi-processed material supplies from the Far East. It was a reasonable assumption a few years ago that when the disruption caused by Japanese invasions of the several supplying areas had been remedied the familiar shipments would return on something like the old terms. How far from the truth that was is seen now in terms of critical shortages of such essentials as oils and oil seeds and tin and extremely inflated costs of what comes to hand. All are familiar enough with the effects but few have the special facilities and the experience of detail, as well as of the larger picture, out of which Sir Geoffrey Heyworth, chairman of Lever Brothers and Unilever, Ltd., has built up from the industrialist's viewpoint a very revealing account of what is taking place. This is one of the principal contributions to the revived "Progress," the excellently produced magazine which the companies first issued in 1899 and suspended during the war. The greatest post-war problem, in Sir Geoffrey Heyworth's estimation, is an extension in a most acute form of the troubles which have hamstrung so much enterprise in the West, the exploitation of the workers for political ends, heightened by the facts that in Asia and S.E. Asia the pawns are more easily swayed than any in the world, are deeply suspicious—not, it must be admitted, entirely without cause—and are nearly all infected with the same ferment of nationalism, with little or no realisation of what is involved. For them the results in India, Burma and Indonesia seem so far to have been almost uniformly disastrous, but that has not reversed the tide or enabled the traditional shipments to be resumed. Since many of those things are indispensable, it is not practicable to take the disinterested view of what is going on in these storehouses of the world, including the withdrawal or misdirection of labour. The Lever and Unilever chairman is in no doubt of our responsibility to provide more and better management and technical direction, and to inject in effect the leavening of European enterprise so conspicuously lacking in most Eastern affairs. "And," he says, "the people who take these jobs will have to look to make their careers in these countries." Many more are needed and those who go will have to stay to identify themselves with those lands and their people. The merchant venturer of to-day and to-morrow will have more exacting responsibilities than any who went before. The rewards will need to be commensurate.

Radioactive Elements

Studies by Soviet Scientists

SOVIET chemists are stated to be conducting exhaustive studies of the distribution of chemical elements in the earth's crust, with special emphasis on the rare and radioactive elements. This information was contained in the report made by Dr. R. Sonya G. Machelson, of the American Cyanamid Company, Stamford, Conn., to the national meeting of the American Chemical Society. Russian scientists, whose projects are sanctioned by the council of People's Commissars of the U.S.S.R., have also stressed physiological and chemical research on the effect of radioactive and rare elements on plant growth.

Much work, she said, had been devoted to the investigation of the occurrence of rare elements in fresh and salt waters, as well as to the radioactivity of waters, soils and organisms. This had led to the discovery of selective concentration of radioactive elements by plants from water solutions and soils. The amounts of radioactive radium, thorium, mesothorium and actinium contained in various sea and land organisms were described for the first time.

Dr. Machelson also reported that Soviet chemists have established the existence of so-called biogeochemical provinces, or regions possessing inadequate or excessive amounts of some chemical elements, causing changes in plant and animal physiology.

Radioactive Isotopes

Increasing World-Wide Use

MORE than 100 research institutions and hospitals in 15 foreign countries have received shipments of radioactive isotopes from the uranium chain-reacting pile at the U.S. Atomic Energy Commission's national laboratory at Oak Ridge, Tennessee. Recording the first anniversary of the initial shipment of the radio-isotopes abroad, the commission said that 21 nations have made formal arrangements to receive them.

The first consignment of radio-isotopes—radioactive phosphorus—was shipped to Australia. A total of 216 radio-isotope shipments were sent abroad during the first year of the commission's programme.

Twenty Elements Now

Isotopes of 20 different elements are now available from the American source. Overseas shipments have included radio-isotopes of 11 elements, radioactive phosphorus being chiefly sought. Extensive use is also made by radioactive iodine in medical treatment and the other isotopes are being used by foreign research groups for work in chemistry, physics, bio-chemistry, physiology and botany.

The report received by the commission from Australia shows that radio-phosphorus has already been used with good results in 11 hospitals for treatment of blood diseases. In addition many projects in other fields utilising other available radioactive elements are being planned.

The British report shows about 50 different biological and medical research projects under way in 21 institutions. Research work includes many problems of a fundamental scientific nature.

The report from Canada shows progress in studies particularly of a bio-chemical nature, utilising phosphorus, carbon and iodine.

New Blast Furnace for Mexico.—A blast furnace with a daily capacity of 200 tons is to be erected in the Maxican State of Sonora.

Rising Chemical Totals

New Plant in Poland

THE situation in the Polish chemical industry during the first quarter of the current year is reported from Poland to have been favourable both as regards the volume of production and the progress of development. Output of soda products, Glauber's salt, sulphuric acid, industrial gases and dyes was higher than in the last quarter of 1947, but there was a decline in the output of superphosphate, states a report sent to the Export Promotion Department of the Board of Trade by the First Secretary (Commercial) of the British Embassy, Warsaw.

In the first three months of this year, the manufacture of the following chemicals started: barium chloride, boric acid, tartaric acid, lead acetate, synthetic tanning extracts and technical gelatine. As a result of the amalgamation of a number of small establishments in the fatty manufacturing industries, the total number of chemical units fell from 147 at the end of 1947 to 144 at the end of March.

The second stage of the reconstruction of the State Nitric Compounds factory at Moscice was completed and daily output of combined nitrogen was raised to 42 tons; installations for the condensation of chlorine (daily output capacity 1.5 tons) and for synthetic of methanol were also opened. The new carbide plant at Bobrek went into production; the present annual output is 15,000 tons).

Australia Rejects Nationalisation.—Mr. Chifley, the Commonwealth Prime Minister, addressing gatherings of miners in New South Wales coalfields, stated that the Government does not intend to nationalise undertakings other than public utilities which are not doing their best under private control and could serve better if they were not so controlled. He stated that there was no evidence that nationalisation of the mines would improve the position, and told the miners they must do their bit to help the Australian people to attain a decent standard of living.

U.S. PRODUCTION CONTINUES TO INCREASE

A STEADY upward trend in production and sales in the chemical industries is shown by the reports of producers to the Bureau of Mines, United States Department of the Interior. The following tables from the mineral market reports show comparison of figures over a period of three years:—

		1945	1946	1947
Boron minerals:	gross weight, short tons	325,935	430,689	501,935
Bromine and bromine compounds:	pounds	79,709,857	42,619,383	78,177,650
Calcium chloride:	short tons	218,320	262,147	271,206
Potash industry:	short tons	1,588,305	1,687,735	1,905,776
Sodium sulphates:	short tons	178,196	198,781	257,294
Sodium carbonates:	short tons	194,045	215,625	293,051

Dust in Industry

Society of Chemical Industry's Conference

A CONFERENCE on "Dust in Industry" is to be held by the Society of Chemical Industry, from September 28-30 inclusive, at the University of Leeds.

Among the many papers to be read are: "Dust Hazards in the Explosives Industry," by Prof. Cumming, R. Rumford and W. G. D. Wright; "Some Methods of Reducing Contact with Dusts in Chemical Manufacture," by L. Marsden, G. W. Robertson, and Dr. R. A. Storey; "Problem of Dust in the Chemical Industry," by G. L. Fairs and E. Godfrey; "Some Practical Methods of Industrial and Atmospheric Dust Elimination," by J. H. Hellyer and J. C. Cleeve; "Precautions Against Explosion and Fire," by G. V. Thom and G. A. T. West; "The Lower Inflammable Limit of Explosive Dusts and the Influence of Diluents Thereon," by Dr. J. E. Garside; "Gas Explosions and Dust Explosions—A Comparison," by Dr. A. G. White, F.R.I.C., and E. Jones.

Physical Characteristics

In the session devoted to "Physical Characteristics and Estimation of Dust," the chairman is to be Prof. H. V. A. Briscoe, and there will be read, in addition to those mentioned above, papers by the following: G. Nonhebel, W. B. Laurie, and E. H. M. Badger. The group entitled "Practical Aspects of the Dust Problem," Part I, will be under the chairmanship of Julian M. Leonard, and a paper to be read, additional to those already quoted, is by: Dr. D. Hill. Mr. A. V. Hussey, O.B.E., is to be the chairman for the group of papers entitled "Practical Aspects of the Dust Problem," Part II, which are variously by L. Smith, R. Carnall and P. J. Rigden.

The "Fire and Explosive Hazards" session will be under the chairmanship of Lt.-Col. Sir Reginald Thomas, C.B.E., and besides those mentioned before, there will be papers by Prof. E. G. Cox and A. G. Peace, Dr. F. G. Tideswell, and Dr. D. Matheson. Under the general heading of "Health Hazards," with Prof. E. C. Dodds, as chairman, there will be read papers by Prof. W. M. Cumming and I. A. Brownlee, Prof. E. J. King, Dr. T. A. Lloyd Davies, Dr. A. M. Currie, Prof. A. L. Roberts, LeDoyen Prof. R. Fabre, Dr. A. J. Amor, Dr. E. R. A. Merewether, C.B.E.

Summations of the work of the conference will be given, variously, by Prof. Briscoe, J. M. Leonard, A. V. Hussey, Lt.-Col. Sir R. Thomas, Prof. Dodds, and S. Robson (chairman of council).

Specialised Photography

New Uses in Science and Industry

"PHOTOGRAPHY in Industry and Commerce" is the title of the revised Kodak Exhibition of Applied Photography which is to be shown in a number of provincial centres this autumn. New photographs and examples of photographic equipment have been added to the exhibition which was shown in London and in industrial centres last year. Among the many techniques to be illustrated, radiography, stress analysis, photo-template technique, data recording and motion study are of particular interest to the industrialist and business man. The scientist will find examples of black and white and colour photomicrography, spectrography, and nuclear track photographs used in atomic research. There are also examples of medical photography and an interesting series of photographs used by the police in the detection of forgery and fraud. A variety of new Kodak photographic apparatus will be demonstrated.

The exhibition will be on view at Newcastle, September 20-24; Liverpool, October 4-8; Nottingham, October 18-22; Cardiff, November 1-5, and Cambridge, November 15-19. Admission tickets are available from Industrial Sales Division, Kodak, Ltd., Kingsway, London, W.C.2.

MINING AND METALLURGY

THE fourth Empire Mining and Metallurgical congress will be held in Great Britain from July 9 to 23, 1949. The congress, first held at Wembley in 1924, is organised by a number of British technical institutions connected with the mineral and metal industries.

The programme will be divided into three parts: (1) inaugural meeting and other official functions in London; (2) technical sessions in Oxford; (3) a number of excursions, based mainly on universities in Great Britain.

Ceramic Conference

The British Ceramic Society has co-operated with a group of ceramic industrialists and technicians in the Netherlands in organising the International Ceramic Congress now being held at Maastricht, Holland. Belgium, Denmark, France, Italy, Norway, Sweden and Switzerland are represented and the programme deals mainly with the pottery artware refractories, and structural clay products branches of the industry. Visits are planned to a number of plants in Holland.

German Plant "Reprieved"

Chemical Dismantling Held Up

THE opposition by the U.S.A. to the dismantling of German plant which might possibly be of use under the Marshall Plan and the well-organised campaign which is being conducted both by German industrialists and trade unions, appears to have been partly successful, as far as the Rhineland-Palatinate is concerned. Out of a total dismantling list containing 83 units, 22 were scheduled for immediate removal. However, the Prime Minister of this *Land* has announced that 15 units have meanwhile been taken off this list. Plants reprieved include 12 former units of the I. G. Farbenindustrie and the Knoll A.G., the large-scale pharmaceutical manufacturing company of Ludwigshaven. The latter had already received orders from the French occupation authorities to commence the dismantling on September 15.

The revision of this list is partly being explained by the fact that, after the destruction caused at the Ludwigshaven I.G. works by the recent serious explosion, the dismantling would have meant a very severe reduction of the chemical and allied industries in the *Land*. There was also much opposition against dismantling the Knoll A.G., including opposition by U.S. interests, because lack of the products which this company makes would have increased the problems connected with the maintenance of public health. It appears, however, that no final decision has yet been made regarding dismantling there.

Dutch-German Agreement

Two-Way Trade in Chemicals

A RECENTLY signed trade agreement forms the basis for the resumption of trade between the Netherlands and the Bizone of Germany. Of chemicals, the Netherlands is to export, until the end of July, 1949, the following items: 1000 tons fatty acids, 1500 tons stearine and oleine, etc., 5500 tons of dextrine, 1000 tons of calcium carbide, 5000 tons of technical soap, 1000 tons of crude linseed oil, 1000 tons of sulphuric acid (66 per cent), 2000 hectolitres of industrial and pharmaceutical alcohol (96 per cent), lactic acid to the value of 106,000 florins, pharmaceuticals and alkaloids (1,126,250 florins), textile auxiliary products and sulphonated oils (265,000 florins), gland and hormone preparations (530,000 florins), and vitamins (53,000 tons). Various other chemicals to the value of 1,325,000 florins are also to be supplied to the Bizone.

The main items in the list of chemicals to be supplied by the Bizone to Holland are: salt 15,000 tons, butyl acetate 700 tons, tetrachlorcarbon 120 tons, magnesium sulphate 4000 tons, barytes 10,000 tons (including 150 tons blanc fixe), natrium sulphate (99½ per cent) 2000 tons, pharmaceutical products intended for the Dutch overseas territories to the value of 530,000 florins, synthetic resins (331,250 florins), fine chemicals for laboratory purposes (159,000 florins) and various other chemicals to the value of 1,060,000 florins.

LETTER TO THE EDITOR

Wasting Manpower

SIR,—It was recently disclosed by the House of Commons Committee on Public Accounts that large numbers of workers were still being trained for the building industry when it was well known that building schemes had been cut. We should like to suggest that the time has come when it would pay the country more thoroughly to co-ordinate its training methods.

My own company recently opened a large factory at Newcastle for the production of Formica, which is a decorative laminated plastic with a large potential export demand. Staffing problems presented and still do present a major difficulty and we are ourselves having to undertake the complete training of all new employees. This has taken time and thereby lost us valuable foreign currency.

Under present conditions the flow of labour is closely controlled, and it should be comparatively simple also to forecast the relative needs of various industries and firms. Is it not possible to establish a planning board to co-ordinate, in respect of training, the needs of industry with the workers available? This could cover not only the immediate present, but could accurately judge the probable requirements of the labour market some time ahead. Such a board might result in considerable saving to industry and help in solving our economic problems. I feel sure that leading industrialists would be only too happy to co-operate with the Ministry of Labour in founding a plan along these lines.—Yours, etc.,

GRAHAME MARTIN-TURNER,
Director.

De La Rue Insulation, Ltd.,
London, W.1.

Continuous Fertiliser

U.S. Development of Urea-Formaldehyde

TO meet the need for a slow-acting nitrogen fertiliser desired for forage crops and pastures, specialists in the U.S.A. are developing a compound of urea and formaldehyde, "urea-form," of which the solubility in the soil can be controlled. Urea-form furnishes nitrogen to plants gradually and over long periods of time—an advantage not common to present commercial fertilisers.

In the form of a white powder, it has a capacity for taking up water from the atmosphere without caking or impairing its free-flowing qualities. When mixed with other fertilisers, it it stated to act as a "conditioner" by checking the caking of such a mixture. Free flow is especially important in fertilisers applied by modern machines which leave a band of fertiliser in the soil a little below and to the sides of the row where the seeds are planted. Tests have also shown that combination of urea-form with quick-acting nitrogen fertiliser furnishes a continuing nitrogen supply throughout the growing season, thus increasing total yield and spreading the plants' growth over a longer period.

A NEW FUNGICIDE?

THE development of a new chemical which is stated to kill the fungi responsible for athlete's foot, ringworm of the scalp and plant losses estimated at more than two billion dollars a year, was recently reported by Dr. F. E. Cislak, director of research of the Reilly Tar and Chemical Corporation, Indianapolis, U.S.A. The synthetic product, called Echridine, is said in laboratory tests to have proved effective against fungi, even when diluted to a strength of one part in 150,000.

The doctor, in his address to the American Chemical Society, emphasised that the proof of its therapeutic value must await the outcome of clinical tests.

Echridine is a derivative of pyridine known technically as 4-(4-ethylcyclohexylmethyl) pyridine. The Reilly researchers, disregarding earlier attempts which had resulted in failure, found they could produce a strong fungicide by changes in the pyridine molecule and, knowing the molecular composition, they were able to synthesise Echridine.

Less than a century ago, the pyridine compounds, now recovered from the coke oven gases of steel mills, were burnt because there was no known use for them.

Paper from Straw

Allegations of Hold-up

A SUGGESTION that home-manufactured paper cannot be sold and is being held up at the factory was made at a meeting of the Lancashire Executive of the NFU, in Preston, recently. Mr. J. Heyes, Ormskirk, reported that paper makers were prepared to give a price for straw for paper making which would enable the merchant to pay the farmer £4 a ton. Unfortunately, that price was not always paid and the Cereals and Potato Committee were now pressing for farmers' trading societies to act as agents. Mr. J. R. Green, Atherton, said he understood that, owing to imports from Scandinavia, paper made from straw in this country was being held up; he knew of one factory that could not sell paper and would soon have to stop using straw, which they had been using to the extent of 300 tons a week.

Mr. W. E. Aspinall, Ormskirk, said the last information he had was that the price of pulp from other countries was almost prohibitive and manufacturers were seeking to develop the home market. Some manufacturers were interested in opening up more factory space for consuming straw. He undertook to press in London for trading societies to be appointed agents for the sale of straw for paper making.

EFFECTS OF ATOM BOMB

RADIOACTIVITY'S part in increasing crop yields of the atom-bombed Hiroshima and Nagasaki regions in Japan, is undoubtedly over-rated, according to Dr. C. L. W. Swanson, head of the Department of Soils, Connecticut Agricultural Experiment Station, New Haven, U.S.A., who was formerly a soils expert on the staff of General MacArthur.

Burned soil as a fertiliser is common in some parts of Japan, the doctor pointed out in his address to the American Chemical Society. Large amounts of ash, he said, were added to the soil by the bombings, and in many cases land formerly occupied by buildings was now cultivated.

Dr. Swanson explained that removal of trees by the explosions had increased sunlight; soil temperatures were raised with a favourable effect on plant growth. The bomb also partially sterilised the soil to a depth of four to six inches; this may have proved beneficial to plant growth in releasing nutrients contained in the bodies of soil micro-organisms.

U.K. Coal Research

Studies of Quantity and Quality

CHEMISTS in Chester are conducting a course of research which has a vital bearing upon the development of coal supplies from the north-west, including North Wales. This co-ordinated scientific approach to the problem of making the best use of our coal deposits represents the most encouraging feature of the nationalised coal industry.

In the Coal Survey Laboratories of the National Coal Board, North-Western Division, physical and chemical experiments of a delicate character are carried out, and are playing an important part in the National Coal Board's policy of reconstruction. Under this, many borings are being put down in the Lancashire and North Wales coalfields. The samples come into the office in complete cores, ranging in height from 1 ft. 6 in. to 6 ft. or more, and are ground to fine powder for the purpose of the experiments. By analysing these samples a complete picture of the quality of the seams can be obtained.

Augmented Supplies ?

In both coalfields exploratory drifts for tapping new areas of coal are being driven at several collieries, and chemists are closely examining these seams as well in order to determine their qualities and the best uses to which they may be put.

Occupying a considerable portion of the time of the staff is the systematic investigation throughout the Lancashire coalfield of a well-known, but comparatively poor quality seam, of which there are fairly large reserves. Samples are being taken and analysed at every colliery at which it is exposed, the assembled data from which will give a comprehensive picture of the properties of the seam. It is hoped that this will be valuable in deciding whether exploitation would be justified, and whether it would be possible to obtain from it by selective working or cleaning an output of reasonably good quality.

Open-cast coal is also receiving attention, and seam samples taken in trial holes dug for the purpose of providing suitable sites are constantly being examined.

The same sort of work is being carried on also at the West Midlands laboratory.

Dr. J. O'N. Millot, Scientific Survey Officer to the North-Western Division of the National Coal Board, who is in charge of the Chester laboratory, has said that the North Wales coalfield, on a basis of estimates made by the Regional Valuation Board, contained reserves of coal of not less than 800 million tons, which should be adequate for at least 200 years.

Continental Shale Oil

More from W. Germany and Estonia

THE exploitation of important deposits of oil shale is reported to be a quickly expanding industry in Southern Wuerttemberg, Western Germany. In July, 1947, the first of 24 distillation retorts of the large works at Frommern in the area of Balingon was started and a second works is situated at Dettershausen.

It is interesting to note that the last-named works is connected with a Portland cement plant which utilises the mineral matter remaining after the oil has been won. The production of a number of derivatives, notably of diesel oil, fuel oil, paraffin, fatty acids, etc., in conjunction with the production of building materials, renders this enterprise very economical.

In addition, a starting material for the pharmaceutical and cosmetic industries is being manufactured under the name of Balingol. Last year, some 4400 tons of crude oil were produced in this area as well as over 41,000 tons of cement and more than 26,000 tons of lime.

It is now being recalled that experiments were carried out over several years to distil Luxemburg oil shales in works in the Rhineland. It appears that this work is now in a fairly advanced stage, but it still remains to be seen whether effective production can be secured.

Soviet Developments in Estonia

According to a report published in the old-established Swiss daily *St. Galler Tagblatt*, the Soviet Russian authorities are paying great attention to the exploitation of the important oil shale deposits which occur in the former republic of Estonia, incorporated into the Soviet Union after the war.

These deposits have already been much fought over ever since methods for their exploitation became known. Nazi Germany coveted them chiefly because they yield a very pure fuel oil of special value for the propulsion of submarines and other vessels.

However, it appears that the importance of these deposits has been enhanced considerably by the fact that they are said to contain 200 grs. of uranium per ton.

The Sillemäe deposits, which belonged to a Swedish group, and were then occupied by the Germans, who destroyed the surface installations and mines in the course of their retreat, have been reconstructed by the Russian authorities who are said to be using large groups of forced labour. There appears, however, to be a shortage of technicians and appeals have been made to those specialists who have fled to Sweden or to Germany to return to Estonia.

Steel Supplies for Industry

"Full Allocations Received for Production"

THE £11 million development schemes which have been approved for the Scottish steel industry represent approximately one-third of the programme which is at present envisaged, according to Mr. George R. Strauss, Minister of Supply, when he spoke at a Press conference in Glasgow on September 10 during a short tour of factories and works in Central Scotland. Mr. Strauss added that many of the schemes which he had mentioned as approved earlier in the week were already at an advanced stage of development.

He indicated that the work which had been so far approved would not have any effect on the final decision, which was still to be taken, as to the ultimate location of the steel industry in Scotland. The alternative schemes of development in the Clyde estuary and in inland estates were still under active consideration. He hoped there would be a final recommendation on this matter well before the end of the year.

Limited Objective

Mr. J. C. Carr, a permanent official of the iron and steel division of the Ministry of Supply, commenting on the development programme at present approved, said it would have the effect of slightly increasing the present Scottish production. He indicated, however, that there was a limit to the worthwhile expansion in an area where most of the steel produced came from imported ore and imported scrap.

At this stage, at any rate, it had not been thought desirable to put the production target at too high a figure. A balance had to be kept within the schemes in England. The present output target of 2.2 million tons was regarded as a realistic proportion for present conditions.

Mr. Strauss revealed that difficulties in scrap supplies were now largely matters of purchase rather than transport so far as Germany was concerned, but he expressed himself as optimistic that the supply would be maintained and even improved in the future. That was what his department was aiming at, he said.

"We have already been getting substantial amounts from Germany, but in the future we want even more."

The Minister said he was satisfied that most industries were now receiving their full allocation of steel for production purposes. There might have been instances of supply falling short of allocation for short periods, due to holidays and similar causes, but generally he denied that any industry was receiving less than its allocation.

What extra steel was available, he said, was, broadly speaking, going into capital improvements, as far as possible, rather than into channels where it would be used for manufacturing industries. Some of the extra steel production was of necessity earmarked for dollar-earning, in order to provide raw materials, but as far as could be done it was being shared out for capital improvements over a wide field of industry.

Mr. Strauss said that what he had seen in Scotland during the past three days satisfied him that the industries were in exceedingly good heart.

STEEL DEFENCE CAMPAIGN

A CAMPAIGN to preserve the steel industry from public ownership has been opened by Mr. Alfred Edwards, M.P. for Middlesbrough East, and is reported to have met with a strong support. The Steel Defence Campaign has a committee of six and an office in Queen Anne's Gate, Westminster.

A nation-wide scheme has been planned, embracing mass meetings, the issue of books and pamphlets, a film and advertisements to show what steel means to the country.

Mr. Edwards declared that the Cabinet had no heart in the decision to nationalise the iron and steel industry, and the issue might bring down the Government.

ANOTHER RECORD BROKEN

STEEL production for August reached the highest figure ever recorded for that month at an annual rate of 14,117,000 tons. An encouraging increase, the first for some time, was shown in the pig-iron production which was at the rate of 9.048 million tons in August compared with 8.908 millions tons in July.

The first part of the month was affected by holidays, but in the second part production was back to the pre-holiday rate of 15 million tons. Details of production, compared with last year, were as follows:

STEEL INGOTS AND CASTINGS
(in 000 tons)

	1948		1947	
	Weekly Average	Annual Rate	Weekly Average	Annual Rate
First quarter ...	287	14,933	216	11,232
Second quarter	294	15,323	244	12,694
August ...	271	14,117	234	12,179

SCIENCE IN WORLD AFFAIRS

BA President Defines the Widening Rôle of Technology

This year's president of the British Association, Sir Henry Tizard (left) whose presidental address is summarised here; and (right) his successor, Sir John Russell, the authority on soil chemistry, whose appointment to be the 1949 president was made by the general committee at Brighton

NONE of the many far-ranging papers presented during last week and this at the annual meetings in Brighton of the British Association for the Advancement of Science covered more comprehensively the field of the inter-relation of science and industry than the presidential address by Sir Henry Tizard, K.C.B., F.R.S.* This, entitled "The Passing World," surveyed critically and realistically the development of science, and especially the varying degrees of technical application in industry, in the past 63 years and the results in human affairs.

The president prefaced his remarks with a review of the great scientific and technical achievements which were presented by workers of this country in the latter half of the 19th century—and received in many cases almost with indifference.

In 1885, he continued, after a few years of depression, during which nearly 700,000 men and women left the country to seek better opportunities overseas, the United Kingdom was still the greatest manufacturing nation of the world. An enthusiastic commentator wrote at the time that "the material greatness of the country is amazing—it exceeds that of any other Empire, Ancient or Modern. But the moral greatness is even grander. . . ."

The United States were not then serious competitors; imports of iron and steel manufactures from the United States reached only an annual value of £500,000 in 1890, but from then on steadily increased. Germany was considered a more serious competitor. In the pursuit of science she stood first among the nations, and she was applying the methods and results of scientific research to industry on a scale and with a determination that far surpassed her rivals.

Germany kept her pre-eminence in applied science until 1914; but it is perhaps worth noting that she never equalled the industrial prosperity of England, judged by the test of real national income. She might have done so, had not her rulers believed that by war they could find a short cut to the happiness and wealth that could have come in the natural course of events to a hard-working and highly educated people anxious to live in peace with the world. The terrible fate of Germany is a tragedy that affects us all, the last act of which perhaps we have not yet witnessed.

Many of the numerous comforts and luxuries which are now within the reach of every diligent working man in England are the result of invention or scientific discovery in or about the year 1885. In the field of applied chemistry one far-reaching development to recall is the electrolytic production of aluminium in 1885. Aluminium was then a rare metal costing £18 a pound. It now costs 10d. a pound.

Thus, although the science of physics was languishing until the discovery of the electron, X-rays and radioactivity in the closing years of the century, it was a time of enterprise and progress in engineering practice. Britain prospered. In 1897, the year of the spectacular triumph of the *Turbinia* at Spithead, we exported goods to the value of one quarter of everything we produced.

* "The Passing World," by Sir Henry Tizard, was briefly summarised in the leading article, THE CHEMICAL AGE, September 11.

Ten years later we shipped overseas nearly one third of the whole national output of goods of all sorts—on farms, in mines, or in factories. If we were doing so to-day we should have little cause for anxiety.

Perhaps it was this very prosperity that caused us to fall behind in some branches of industry, for when there is little unemployment and when the standard of living is obviously rising in all sections of the community, there is an excusable tendency for manufacturers to go on doing what they know they can do successfully, rather than to launch out in new directions. Is not this, rather than the neglect of science, the chief reason for the fact that synthetic dyes and fine chemicals were manufactured in Germany, rather than in their original home England?

No Dearth of Ability

Whatever the answer to this question, the fact remains that when war started in 1914 we were caught off our balance. We found ourselves dependent on our enemies for many essential products and instruments on which our power to make war, and to maintain health, depended.

But, to everyone's surprise, we also found that the reserve of scientific ability in the country, though not large, was high enough in quality to overcome the immediate dangers with remarkable speed. Young men from the universities who had spent their time on researches of no practical importance applied themselves with success to problems often completely outside the range of their previous studies. We had the same experience in the Second World War, although fortunately we also had the foresight to prepare for some of the worst dangers beforehand.

There is a clear lesson, I feel, to be drawn from this experience. Whatever may be done, in a burst of public enthusiasm, to support and promote schools of research at universities, nothing should be allowed to lower the quality; and size, beyond a certain point, undeniably does. A research laboratory, of whatever nature, is like a living cell. Once it reaches a certain size, which may differ with the nature of the subject, it must divide or die.

The shock caused by the exposure in 1914 of our industrial shortcomings, which had been concealed by the apparent prosperity of previous years, led to a great increase of research by industry and by Government.

University schools of science were greatly enlarged, and under the influence of the great men of the inter-war period there was a surge of discovery which put Great Britain in the van of progress in nearly all branches of science. We became a scientific nation. The newer industries, such as the viscose and radio industries, which had been founded on science, rapidly developed. The chemical industries took on a new and active lease of life. Germany, badly disorganised by defeat, ceased for many years to be a serious competitor in the world market.

Many of us have felt confident that when leadership in scientific and industrial research was allied to experience in commerce and manufacture, and to skill in craftsmanship, our country would have little difficulty in maintaining its position among the nations of the world. We have been disappointed.

I am referring now not to the acute difficulties of the present day, but to the general trend of events before and after the First World War, when in spite of a nearly continuous advance in national income and standard of living, Great Britain gradually lost her pre-eminent position.

We cannot attribute this relative decline to the 1914 war. That war had curiously little effect on our economy. Nor can we attribute it to the world depression in the 1930's. The depression affected us much less than many other nations, for owing to the great fall of prices of food and raw material the terms of trade moved sharply in our favour. During 1930-38 the volume of exports necessary to purchase a given volume of imports was only two thirds of what it had been during 1885-1914.

Objectives

To what then shall we attribute the relative decline? Shall we argue that a main cause was that research was on too small a scale, or shall we seek for other reasons?

Let us first be clear about what results we expect to come from the application of science to industry. The primary object of industrial research is severely practical. It is not to enlarge the boundaries of knowledge, or to publish scientific papers, although that may be a prerequisite or a consequence.

The object is to do something that has never been done before, or to do things better than they have been done before. And it has, or should have, the special object of reducing the labour required to supply the material needs and wants of men. All social progress such as spread of education, promotion of health, opportunities for leisure and healthy recreation, must depend on the power of science and technology to increase the productivity of industry.

The rate of social reform is set by the rate at which productivity increases; and social unrest is inevitable if reform lags too far behind the advance of technology, or is pressed too thoughtlessly before it.

In Britain, the productivity of labour is of primary importance, for unless it is as high as, or higher than, in other manufacturing countries, we shall not be able to compete in

the markets of the world. And the productivity of labour in Britain is far lower than it could be if the results of past research were more resolutely and continuously applied.

We find this particularly in certain industries of great importance. In the coal industry the results are painfully obvious—the coal raised per man employed is now lower than it was thirty years ago, when nearly all coal was hewed by hand.

Taking British industry as a whole, productivity is far lower than in the United States. In both countries about 40 per cent of the population is gainfully employed. In the United Kingdom the proportion engaged in manufacturing, building and civil engineering, which covers the production of all capital and consumer goods (other than minerals or food) is now a little less than 18 per cent of the population. In the United States the corresponding figure is 12 per cent; and yet in proportion to the population the volume of production is far higher than in the United Kingdom.

The causes of the relative productivity and wealth of nations are, of course, many and complex. We no longer have any outstanding natural advantages, and we must expect that given approximately equal skill in technology other nations with greater natural advantages will surpass us.

Resources or Ability?

Only by maintaining leadership in the application of science can we hope to keep our position among the great nations. So it is not surprising that the United States, and Canada, for example, with their great natural resources, and abundant supply of cheap power, should have passed us in wealth and productivity before the war. It would have been surprising if they had not.

But it is by no means so easy to explain why Switzerland, which in 1885 possessed a national income per head about two-thirds of that of the United Kingdom, should have equalled us in prosperity by 1939; or why the industrial productivity of Sweden, a country that has no coal, should have been rising so much more rapidly than ours in the years between the wars.

These two countries cannot be said to possess natural resources superior to ours; nor can it be argued that in the quality or quantity of scientific and industrial research they excel us. But I suggest that they, in common with the United States, possess a higher average standard of technology than we do, and have a much greater proportion of men of high scientific education in executive control of industry.

I quote them in support of my view that it is not the general expansion of research in Britain that is of first importance for the restoration of its individual health, and certainly not the expansion of Government research remote from the everyday problems of industry. What is of first importance is to apply what is already known.

The fact is that all really new developments of industry are the product of the work of very few men. In general, knowledge in the physical sciences now accumulates at a rate much faster than it is, or possibly than it can be, applied in industry.

Knowledge Not Applied

There is a vast amount of knowledge waiting to be used. No new discovery, in any field, is likely to have so quick and beneficial an effect on British industry as the application of what is already known. We hear, for example, of the possibility of the production of power from atomic sources of energy. I do not think that anyone will be rash enough to prophesy what discoveries of real industrial importance will result from the researches now in progress; but I shall certainly assert that the production of power from uranium cannot bring such economic benefits to Britain within twenty years as would the practical application of known methods of economising coal.

Although I have been interested in the problems of industry for many years, I have never been closely concerned with its conduct. But for much of my working life I have been intimately concerned with that peculiar business called war, which is as old as agriculture, which is subject to the most violent booms and slumps, the cause of which we do not understand, and in which the incentive to succeed is greater than any profit or ideological incentive in civilian life.

We shall all hope that this business is moribund, and shall do our best to kill it: but in the meanwhile it is possible that other old industries have much to learn by studying the principles of its successful conduct.

In the first place, let us note that the managing directors, the chiefs of staff and commanders, are all carefully selected highly trained professional men, who have gained their experience in a hard school, and who, at intervals in their career, have had the opportunity to study, at staff colleges and elsewhere, the fundamentals of their trade.

The technical efficiency of the business is entrusted to a body of engineers and technologists, who have had an advanced specialised education and experience, and who are in personal contact at all levels with scientists who are concerned with research and development. This secures that in all research, however recondite, there is a practical objective, and that there is also a continuous urge to improve detail. There is no part in the whole process from research

to production and use that is neglected, and none in which scientific thought and influence are wholly absent.

It does not need any profound research to show that the British industries that are now best standing up to the strain of adverse circumstances are those that most nearly approach the system I have described.

The chemical industries, for example, have gradually developed a similar organisation over the last thirty years. Neither research nor development has been neglected, and management is in the hands of men highly educated in pure and applied science. The result is that our chemical industries are a source of great and growing strength in peace and war. Forty years ago they were far inferior to the German industries; now they have little to fear from any competitors.

In the steel industry, the efforts of which now merit our admiration, it is not uncommon to find management and direction entrusted to men of the highest reputation in science and technology.

Turn your eyes on any industry in the world that is similarly organised, on the steel industry of Australia, for example, or the photographic industry of the United States, or the machine-tool industry of Switzerland, and you will find that they are the best able to weather the storms and take advantage of the fair winds of trade.

Finally, all depends on good design and production. Our weakness in the war was not to be found in the judgment of what was best to do, nor in the scientific work necessary to do it. It was when the stage of design and production was reached that we fell short of the best standards.

Enthusiasm for Research

The magnetron, which contributed more to the success of the Allies than any other single invention, was a product of British science; but it had to be redesigned in the United States for economical manufacture. Penicillin, the greatest practical achievement of medical research during the war, also originated in Britain, but unless American skill in large-scale manufacture had been available, many thousands of men, who now enjoy a healthy life, would have died.

We now see history repeating itself. After the Second World War, as after the first, there is a cry for more research, in industry, and by Government, and a strong demand on the universities to expand their school of science.

Temporarily this enthusiasm is having an unfortunate effect, for the schools are getting starved of teachers; and unless a high standard of teaching is maintained in our schools, the next generation of scientists will suffer. In the long run, too, the expansion of research will fail to produce the hoped-for result unless we promote at the same time education in the higher branches of technology, and unless the technologist takes his rightful place in industry.

Pure invention still has its place; but industrial prosperity will depend more and more on the continuous application of science to industrial practice. Unless we can raise our standard of technology, unless there are many more men in executive positions in industry whose practical experience has been preceded by a scientific education, we shall inevitably fail to keep our place among the great manufacturing nations.

[Sir Henry Tizard concluded his survey with an extended study of the profound population changes brought about by medical science in the past 60 years by preventing the attrition of disease, war and malnutrition. Those circumstances had helped to bring about a situation of grave danger of world-wide famine. No simple solution arising from the unaided action of scientists could be looked for. Escape from possible disaster, in his view, would depend, in this country, upon the greatest possible improvement and expansion of husbandry, with close attention to the scientific prevention of diseases of animals and plants, and the development of our colonial territories, especially the under-populated tracts of Africa.]

German Analytical Practice

Microchemistry Progress

ACCORDING to BIOS Final Report No. 1606, the Kaiser Wilhelm Institute of Heidelberg used the Schuetze-Zimmerman method for the determination of oxygen. Compounds were decomposed in an atmosphere of nitrogen and the resultant gases passed over heated charcoal, converting the oxygen to carbon monoxide. This was then passed through a heated copper tube and thence into iodine pentoxide heated in an acetic acid bath. The liberated carbon dioxide could then be estimated gravimetrically or the liberated iodine titrated in the usual way. I. G. Leverkusen estimated oxygen at room temperature by activating the iodine pentoxide with concentrated sulphuric acid and pumice.

For the determination of acetyl groups, Heidelberg University chemists treated compounds with *p*-toluene sulphonic acid in the presence of ethanol, thus converting the acetyl groups to ethyl acetate. The latter is saponified with sodium hydroxide solution and the alkali used determined by back titration.

The preparation of pure ammonia and pure hydrochloric acid also receive mention in this report.

CONSERVATION OF VITAL MATERIALS

Scientists' Concern With Full Use and Recovery

THE economic aspects of the application of science formed the principal or subsidiary subjects of several of the papers presented to the British Association at Brighton. Surveys and discussions underlined the increasing awareness of the continued waste of essential elements, often due to unsuitable and unimaginative applications. Several contributors dealt very realistically, with the world shortage of foodstuffs, showing that while the condition was in no sense new it was potentially a greater menace than before and the most stringent measures, scientific, social and economic, would be needed to avert the worst consequences.

Emphasis was given in this, and in the studies of problems in other fields, that no solution could be looked for arising from the advance of scientific knowledge alone.

The theme of conservation of other vital materials was expanded in a very practical survey by Prof. J. D. Bernal, introducing a discussion of the conservation of chemical elements. The rapid increase in the use of materials by industry and agriculture threatened to exhaust the most concentrated deposits in a matter of decades. For countries with relatively limited resources like Britain, the problem was the more acute, he said.

Mining and Smelting Wastes

There was a cycle of industry, in which the elements were collected, dispersed, and again concentrated. The object must be to eliminate waste at every stage. In mining there was a more or less avoidable waste in material left in the ground or dumped as incapable of further extraction.

Mining and smelting processes had developed in a pre-scientific age, and while there had been improvements in detail there had not been enough fundamental examination of results in the light of modern technique.

It was at last coming to be recognised that no element should be used where its particular properties were not utilised to the full. In a few cases the peculiar properties of an element were necessary, but in most cases there was a fairly wide range of substitution. An adjustment to existing or foreseen shortages should be possible. By using more intelligence and less material, cycles could in many cases be kept continually expanding on the same amount of material.

Destruction and dissipation in chemical processes needed examination. The advisability of locking up various elements for very long periods in structures should be examined. A general study of the principles of recovery was needed and its systematic application to all elements with due priorities. An example of improper use of material was the all-aluminium house.

World Resources

Emphasising that conservation was itself a complicated study, Dr. R. P. Linstead noted that more than half the research at the Chemical Research Laboratories at Pedington was on some aspect of that subject. More minerals had been taken out of the ground in the U.S.A. since 1900 than from the whole world in its previous history. There was a general world shortage of lead. It had been estimated that America, the world's largest producer, had, taken the pre-war rates of usage, eleven to twelve years' commercial reserves and five years' sub-marginal reserve.

New resources of lead were unlikely to be found and the mineral should be reserved for uses where its properties were essential.

There was no world shortage of sulphur, but its import was a drain on our dollar resources and there were sources of recovery in this country.

The comparatively high standard of economy attained in the iron and steel industry was revealed by Dr. W. M. Thring, who said that in the productive plants there was little waste of iron, apart from a 6 per cent loss in the slag, but large amounts of scrap were immobilised in the rest of industry. The large scale of the experiments needed made the investigation of alternative processes to smelting difficult.

Dispersed Sulphur

In a paper presented *in absentia*, Dr. R. Lessing stated that the amount of sulphur present in the coalmines in Britain annually was equal to 10 million tons of sulphuric acid, ten times our present production. Most of this sulphur escaped into the atmosphere to attack buildings, metal, clothes, and health. Methods for its extraction from chimney gases and the spent oxide of gasworks were known and used in isolated cases.

The increase of world food supplies would need increasing amounts of fertiliser, and the demand for sulphur would grow steadily and rapidly. Its dissipation must be prevented wherever possible.

ELECTRODEPOSITION PRINCIPLES IN ANALYSIS

Classical Methods and Modern Trends

From a Special Correspondent

THE first electrodeposition experiments were carried out as early as 1850. In 1883, Killiani showed that there was a possibility of separating metals by using potential control. Then, round about 1900, Sand proved that rapid stirring was theoretically necessary for success in controlled potential methods. Thus, these methods, although they have not yet been very widely applied, have been known for many years.

When a metallic salt is dissolved in solution, it breaks up into cations and ions, and on passage of an electric current, the metallic ions pass to the cathode and are discharged, while the anions are discharged at the anode.

$$MA \rightarrow M^+ + A^-$$
$$M^+ \rightarrow \text{cathode}$$
$$A^- \rightarrow \text{anode.}$$

This elementary statement requires modification when conditions are further investigated. From the Nernst equation, it can be shown that when a metal is dipped into a solution,

$$E = E_o + RT\text{Log}_e \frac{C}{nF}$$

where E = equilibrium potential difference between the metal and its solution,

E_o = potential in a molar solution using the normal hydrogen electrode as an arbitrary zero,

n = the valency of the ion,

F = the Faraday constant,

C = the concentration (strictly the activity) of the ion,

the metal will not be discharged at the electrode until the potential of the electrode is made more negative than its equilibrium value, in other words, until the applied potential is greater than E. From this equation, it can be seen, among other things, that a definite voltage is required to produce deposition, and for every tenfold increase in the concentration of the ion, the voltage must be raised by 0.058 volts.

TABLE I

$Na \rightarrow Na^+$	−2.8	$Sn \rightarrow Sn^{++}$	−0.19
$Mg \rightarrow Mg^{++}$	−1.55	$Pb \rightarrow Pb^{++}$	−0.12
$Zn \rightarrow Zn^{++}$	−0.76	$Bi \rightarrow Bi^{+++}$	+0.25
$Cd \rightarrow Cd^{++}$	−0.42	$Cu \rightarrow Cu^{++}$	+0.34
$Ni \rightarrow Ni^{++}$	−0.22	$Ag \rightarrow Ag^+$	+0.80

The potential for each metal is different. Normal electrode potentials for some of the commoner ions are shown in Table I.

When only one metal is contained in the solution, or when there is only one easily deposited metal, the process of determination is relatively simple. Platinum electrodes are normally used, unless there is some reason for avoiding this metal. The electrode on which the deposition takes place is usually made either of foil or of gauze, so as to present a large surface to the solution. Consequently only a very thin deposit of metal forms. Stirring may be carried out by means of a separate mechanical stirrer, or by using one of the electrodes, usually the anode, as a stirrer. Electrodes of this type are shown in Fig. 1 (below).

In the circuit shown in Fig. 2 (page 387), the applied potential is adjusted to a suitable value of anode-cathode potential. It is not necessary to know the precise cathode potential. Usually, however, the applied potential chosen is very little above that just required to cause deposition

Deposition is maintained until all the metallic ion has been deposited. For any

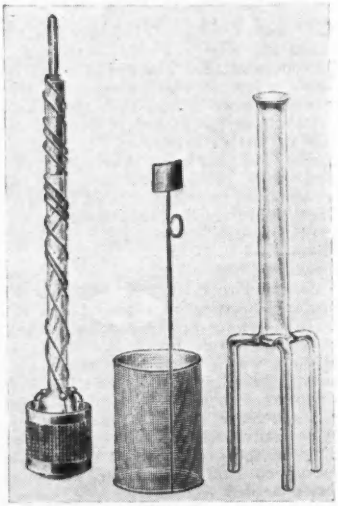


Fig. 1.
(By courtesy of Griffin & Tatlock, Ltd.)

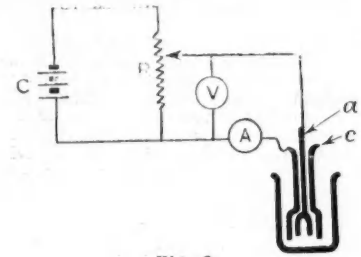


Fig. 2.

determination, the conditions of temperature and other variables have been chosen so as to give a fine deposit, which will adhere firmly to the cathode, for obviously a crystalline deposit which would drop off the cathode would be useless for the purpose in view. The deposit is then dried carefully. A very finely divided metal will be liable to oxidise.

If the determination is to be carried out on a metallic sample, this will first have to be got into solution. Some points must be borne in mind about the various acids which may be used for this purpose. Thus, while hydrochloric acid is generally useful as a solvent, chlorine will normally be liberated at the anode when current is passed. This will of course attack platinum electrodes, and therefore evolution of chlorine must be avoided.

This can be achieved by the addition of an anodic depolariser, such as formaldehyde, hydroxylamine of hydrazine. These last two are normally used as the hydrochlorides. Again, hydrochloric acid or chlorides must not be present if silver is the metal being determined, since the metal must be completely in solution before the determination can be carried out.

Sulphuric acid is the most satisfactory acid when regarded from the point of view of electrodeposition requirements, but is not normally a very useful solvent. Nitric acid is a cathodic depolariser. It will this prevent evolution of hydrogen at the cathode. This is usually desirable, and is particularly so when dealing with a metal which tends to produce a spongy deposit, since such tendency is increased if hydrogen is evolved.

Another instance when the presence of nitric acid is useful is when it is desired to deposit an oxide on the anode rather than a metal on the cathode. The presence of the nitric acid will help to prevent cathodic deposition.

Nowadays, stands carrying the electrodes and auxiliary apparatus are available commercially, and such a stand, set up for operation, is shown in Fig. 3.

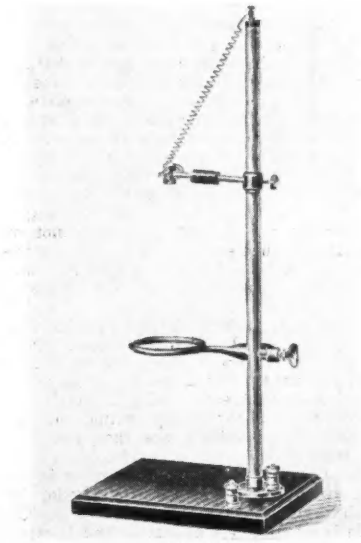


Fig. 3.

(By courtesy of Griffin & Tallock Ltd.)

Separations

If a solution contains two species of metallic ions, and if the cathode is maintained at a potential lying between the potentials characteristic of the two ions, only one of these should, theoretically, be discharged at the cathode. Consequently a separation of the ions should be possible, through control of the applied potential.

In actual practice there are numerous complications arising from such factors as concentration polarisation, overvoltage, and the necessity for having the conditions such that the physical nature of the deposit on the cathode is gravimetrically suitable. As a result, a satisfactory deposition of one metal, leaving the other completely in solution, is rarely achieved unless the normal potentials for the two ions differ by at least 0.3 volt.

For most purposes, it is found that the cations normally determined by electrodeposition are usually divisable, on this basis, into seven classes. In six of these, the metals deposit on the cathode, while in the seventh, the oxide deposits on the anode. Metals in different groups are relatively easy to separate, but within the groups separations by straightforward methods are not normally possible. In the first group are included gold, mercury, silver and the

platinum metals. The second group comprises copper, antimony, bismuth and arsenic, and the third contains lead and tin.

All these metals may be deposited in acid solution without any very precise control of the *p*H. If the *p*H is carefully controlled, the fourth group, cadmium and zinc, can also be deposited from acid solution, but no hydrogen must be evolved at the cathode.

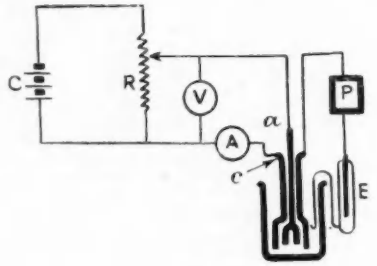


Fig. 4.

The metals in the fifth group, iron, cobalt and nickel, are normally deposited from alkaline solution, and this is generally more difficult than in the acid depositions.

The sixth group, and the last group to deposit as metals at the cathode, comprises the alkaline earth and alkali metals. Direct deposition methods are not employed for these elements. As a rule they are deposited at a mercury cathode. The amalgam is then decomposed, and the metal is determined by subsequent titration of the hydroxide.

For controlled potential separations (as will be seen from Fig. 4) the circuit is similar to that used for simple deposition, with the addition of an auxiliary electrode in a potentiometer circuit to measure the applied potential. The externally applied e.m.f. is increased until the potentiometer in the opposed, auxiliary electrode circuit gives the correct reading. Continual adjustment will be necessary throughout the course of the deposition, as the concentration of the ion being deposited gets lower.

The separation of silver and copper by such methods can be taken as a simple example. Because of the considerably more negative normal potential of silver, it starts to deposit long before a value of the applied current necessary to cause copper to deposit is reached. As the concentration of the silver ions falls, the applied e.m.f. must be gradually increased. However, considerable increase of the e.m.f. would cause the copper ions to deposit, and so the current must be suitably adjusted so as to prevent this.

In order to achieve a quantitative separation of silver from copper, it will be found that in practice it is necessary to start with a solution which is not more than 0.1 N with respect to copper. If this condition is observed, the concentration of silver ions in the solution will have fallen to a negligible value before the copper ions start to deposit.

Alloy Deposition

In the controlled potential deposition which has just been considered, it has been assumed that the aim has been to achieve separation. Certain instances in gravimetric work require just the opposite, the co-deposition of two metals.

Silver, for example, tends to give a very coarsely crystalline deposit, and one which is not very suitable for gravimetric work. However, if silver and mercury are deposited together, then a good deposit can be obtained. As a consequence, it is the usual practice, when determining silver, to add to the solution a known amount of a standard solution of mercury. The total deposit obtained is weighed, and a correction is made for the amount of mercury known to have been added, difference giving the amount of silver.

Again, arsenic determinations are unsatisfactory, except in the presence of copper. As will be seen from reference to the groups, copper and arsenic occur in the same group, and will co-deposit. But in the presence of copper, the deposition of arsenic, which in simple solution is not complete, is quantitative. Thus, addition of a known amount of copper sulphate to an arsenic solution permits the arsenic to be deposited, completely, a subsequent correction being made for the amount of added copper.

It was mentioned earlier that metals in the seventh group were deposited, not on the cathode in elemental form, but on the anode as oxides. For example, lead, manganese and cobalt can readily be estimated in this fashion.

It will have been noted that metallic lead can be deposited on the cathode (third group), but the usual practice is to deposit it on the anode. This permits of its determination simultaneously with a metal such as copper, the copper appearing on the cathode; the terminals are then reversed, and lead is deposited as oxide.

There are two experimental errors in the determination of lead on the anode, for which corrections must be applied. The oxide is more or less hydrated, and it seems impossible to dry the deposit completely. In consequence, an empirical factor must

be applied for the added weight due to water.

On the other hand, complete deposition of the lead does not take place, and there is therefore a negative error which arises from this cause. This latter error, which is opposed to the former, may also be corrected for empirically. However, some workers have corrected for the incomplete deposition of the lead by the use of a radioactive indicator, so that measurement of the radioactivity of the residual solution indicates the amount of lead not removed in the course of the deposition.

Electrographic Analysis

Strictly speaking, it would be more logical to consider electrographic analysis before gravimetric electrodeposition methods, since electrography is really the qualitative application of electrodeposition. However, it is mainly a more modern development, which depends on its effectiveness largely on the use of organic reagents, and therefore chronologically this is the correct place to deal with it.

Using an apparatus such as that shown in Fig. 5, passage of a current causes ions to flow from a metallic surface into a moist paper which has previously been impregnated with a reagent which will form an insoluble, and preferably a highly coloured compound with the metallic ions. As a consequence, the presence of any metal can readily be demonstrated, and, in addition, the existence of a uniform distribution of the metal, or of segregation, can readily be discerned.

Internal Electrolysis

A final method developed in recent years as an extension of electrodeposition methods in the classical sense must be mentioned. In this, no external source of current is used, the necessary current being supplied by the solution of a base-metal anode in the electrolyte.

The cathode is usually made of platinum gauze, and the catholyte and anolyte are usually separated by a parchment membrane. This method is particularly useful

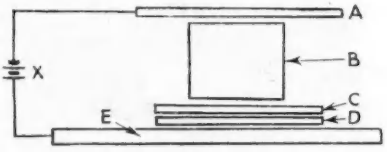


Fig. 5.

when it is desired to determine small traces of a more noble metal in the presence of large amounts of a base metal.

Two examples will illustrate the use of this method. Where it is desired to estimate traces of copper in steel, an iron anode is dipped into ferrous sulphate solution, which is maintained in the ferrous state by the addition of a little hydrazine sulphate.

This portion of the cell is contained in a

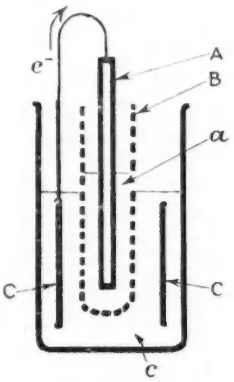


Fig. 6.

parchment bag, which is placed centrally in a platinum gauze cathode, inserted in the catholyte, a solution of the steel being examined (Fig. 6). The anode and cathode are connected externally by a wire. The anode, dipping in the anolyte, goes into solution as ferrous ions, liberating electrons:

$$Fe \rightarrow Fe^{++} + 2e^-$$

These liberated electrons flow through the external conductor to the cathode, where they discharge the copper ions from the solution of the steel on to the platinum cathode:

$$Cu^{++} + 2e^- \rightarrow Cu.$$

Again, the procedure may be used for determination of traces of mercury in brass. The set-up is the same, but now the anode is of copper, while the anolyte is copper sulphate solution. Electrons liberated by the solution of the anode flow externally to the cathode, and cause the mercury to deposit:

$$Cu \rightarrow Cu^{++} + 2e^-$$
$$Hg^{++} + 2e^- \rightarrow Hg.$$

Numerous extensions of the internal electrolysis method to industrial problems involving trace elements may be anticipated.

BRITISH EXHIBITION AT COPENHAGEN

Some Representative Chemicals and Scientific Instruments

ADDITIONAL to the information which has already been published in THE CHEMICAL AGE in recent weeks relating to the British Exhibition in Copenhagen—which opens to-day (September 18) and continues until October 3—we are now advised that a Trade Information Centre will be provided there and will be located on the first floor of Nimb Restaurant in the Tivoli Gardens. Operating under the joint auspices of the British Import Union, the British Export Trade Research Organisation, the Federation of British Industries, and the Danish Merchant Guilds Association, it will handle inquiries from exhibitors and visiting British exporters and manufacturers on general marketing conditions for British goods in Denmark, Sweden, Norway and Finland. The centre will be open on weekdays from 10 a.m. to 12 noon and 3 p.m. to 6 p.m., and 10 a.m. to 12.30 noon on Saturdays.

The following are particulars of some of the chemicals and scientific instruments exhibits which have come to hand at the time of going to press:—

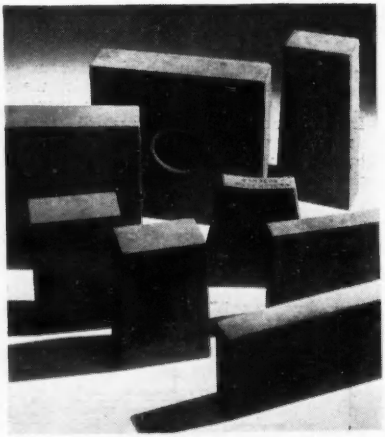
Exhibits of Chemical Firms

PETROCHEMICALS, LTD., is desirous of introducing to the Scandinavian countries the initial products of the Catarole process, and is therefore displaying at Copenhagen a range of over 60 chemicals. There will be included a simplified flow chart to illustrate the operation of the plant and a map showing the layout and location of the site. The firm believes that great possibilities for Scandinavian and European industries generally are opened by this new British chemical process which will, it is stated, constitute a great dollar saving for Great Britain. It is estimated that from four to six million dollars annually can be saved as a result of converting simple petroleum hydrocarbons into complex industrial chemicals at home rather than importing finished chemicals from dollar areas.

ALBRIGHT AND WILSON, LTD., chemical manufacturers, is taking part in the Copenhagen exhibition with their associated company, Thomas Tyrer & Co., Ltd. To make the most of this opportunity of forming personal contacts with Scandinavian and other friends, Mr. G. W. Startin, Albright & Wilson's export manager, hopes to be present throughout the run of the exhibition. Having lived and worked in Denmark and Sweden for many years, it is felt that Mr. Startin's intimate knowledge of the people and languages will be of great value. He will be accompanied by Dr. B. V. de G. Walden, manager of the firm's European technical department, and visits will also be paid by Mr. J. C. Christopherson, sales director, and Mr. Keith Piercy, development manager.

WILLIAMS (HOUNSLOW), LTD., are exhibiting examples in their general range of dyestuffs for all purposes and their harmless colours for foodstuffs. A particular feature of this firm's exhibit is the display for the first time of a range of new browns and blacks for the dyeing and staining of leather, which is expected to prove of especial interest to Scandinavians.

BAKELITE, LTD., display in the chemical section the three major groups of plastics produced by the company. These materials are grouped in three units—one devoted to Bakelite thermosetting materials, another to Warerite decorative laminates, and the third to Vybak plastics for the covering of electric cables and the production of extrusions of all types. In a section devoted to Bakelite resins and cements there is a photographic display showing the results of a ten-year test on a steel plate protected with Bakelite varnish. A single coating of this protective film has withstood ten years' immersion in moorland water of a highly corrosive nature.

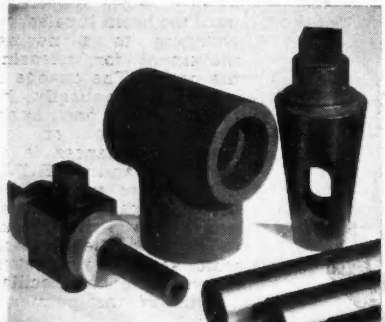


"Carblox" tiles for use with chemical tanks

MONSANTO CHEMICALS, LTD., is showing a number of its principal products, each of which forms the centre of a display symbolising one important Danish industry, and representing the many others of the firm's products which are used in this particular industry. The industries concerned are those of rubber, pharmaceuticals, paint and plastics, timber, textiles, disinfectants, leather and food.

THE MORGAN CRUCIBLE CO., LTD., is showing, on Stand No. 72 (agent in Denmark Brodrene Dahl), crucibles, basins, stands, muffles, and covers, representative of the wide range of plumbago foundry equipment manufactured by them. Crucible melting is claimed to have many advantages: *e.g.*, it protects the metal from the flame and from gas pick-up, minimising the metal loss due to oxidation. Plumbago crucibles, in particular, do not contaminate the metal, which cannot stick to them, and by virtue of their high thermal conductivity they are economical of fuel. Salamander and salamander super crucibles are claimed to set a standard for quality which is recognised throughout the world, and are renowned for their consistently long life, high thermal conductivity and mechanical strength.

All Morgan crucible furnaces have the following features in common: They are designed to show the highest melting efficiency coupled with the strictest economy in fuel consumption, being rapid melters consistently with long crucible life. Every practical detail is considered to ensure easy and comfortable operation. They are economical of labour and floor space; and they are all very versatile in the metals and jobs they can handle. Of the various types manufactured, three are being shown at Copenhagen, namely, lift-out, the bale-out, and central axis tilting.



"Morganite" carbon cocks, tee piece and impervious tubes

On Stand No. 180 (Danish agent Otto Ahrens, Ltd.) the Morgan Crucible Co., Ltd., has a display of its "Morganite" all-carbon engineering parts. Impervious carbon is of interest in industries handling corrosive chemicals; it can be used to handle all but the strongly oxidising acids in a hot and concentrated state, and even hot sulphuric and hydrofluoride acids can be handled with perfect safety. Examples of "Morganite" impervious products are valves, stop-cocks, chemical fittings, and tubes for heat exchangers.

Chemical Resisting Bricks

Of special interest to the wood pulp and paper making industries are the Morgan Co.'s "Carblox" carbon chemical resisting bricks and tiles. They are used for the linings of wood digestors (sulphite process) and pressure storage tanks for sulphite liquors. In an inert atmosphere, carbon withstands temperatures of well over 2000°C. It does not melt, and the temperature has to be considerably higher than 3000°C. before it sublimes. It is therefore an ideal material for furnace tubes, boats, and moulds, for the sintering of tungsten carbide tool tips. "Morganite" carbon tube is used as a heating element directly heated by electric current to produce the high temperature required; and the boat or mould containing tungsten carbide to be sintered is placed inside the tube, the complete equipment being enclosed in an inert atmosphere, usually hydrogen. Then there are "Morganite" carbon piston rings, used by food manufacturers, mineral water manufacturers, brewers, and paper manufacturers, as an ideal means of producing the oil-free air, gas, or steam they require. Compressors fitted with "Morganite" carbon piston rings are claimed to deliver air, gas, or steam, perfectly free from oil, for with carbon piston rings and packing the need for lubrication is entirely eliminated. Moreover, the cylinder bore, instead of wearing, is found to acquire a mirror-like polish. Usually the piston is built up to accommodate the rings, which are stated to have a working life of about 15,000 hours.

Then there are "Morganite" carbon seals, which are employed to seal a wide range of fluids.

FOAMITE, LTD., Station Road, Langley, Bucks., is exhibiting a representative range of its fire-fighting appliances, especially its CO_2 portable units, which are widely used in chemical works and are probably the most versatile means of "blanketing" a blaze. An attractive booklet "Safeguard-

ing Your Property" describes and illustrates these appliances.

BAIRD AND TATLOCK (LONDON), LTD., is showing a representative range of scientific apparatus which it makes, laboratory equipment, pure chemicals and fine reagents. Its principal exhibits of equipment are the Warburg bath, electrolytic analysis apparatus, and its balances, notably the ZDC.259a of the aperiodic projection type.

The Warburg manometer is essentially an analytical tool, for kinetic measurements on the progress and rate of a reaction or system of reactions. The technique is flexible and adaptable to the study of a diversity of systems of varying complexity, and it would seem that any reaction involving the evolution or absorption of a gas could be conveniently studied by these methods. In addition, many reactions not directly involving gases may be investigated by indirect manometric measurement, one of the products being made to evolve or absorb a gas in a further independent reaction. A most important development is the use of the Warburg apparatus for quantitative micro determinations. Warburg manometers have also been utilised for direct gas analysis, and as micronitrometers, but no kinetic measurements are involved.

The B.T.L. industrial electrolytic analysis apparatus is made in single test units as well as multi-test outfits. The single-test unit (illustrated on p. 393) for use with stationary electrodes, has high-speed independent stirring and a variable speed up to 5000 r.p.m. It can be supplied with or without hot plates. The multi-test outfits consist of two to five single-test units mounted side by side on a bench to form a "bank." The bench top is of ½-inch Solacite, which is acid resistant, while the lower part serves as a cabinet to house the independent rectifiers and transformers necessary for each unit. The transformers have a maximum consumption each of 100 to 120 watts, and the selenium type rectifiers give a D.C. output of 7 amps. at 12 volts.

MUIRHEAD & CO., LTD., Beckenham, is showing among a great variety of highly developed measuring devices, its acoustic strain gauge. The principle on which this operates is basically the comparison of two audio frequencies, produced by the test and reference gauges. The frequency of the test gauge changes when stress is applied

Aperiodic balance by Baird & Tatlock, Ltd., with 3-weight rider attachment and a modified release system incorporating a slow movement until the beam is released, changing to a normal movement for releasing the pans. The change is made automatically by turning the one knob. The purpose of all aperiodic balances is to save time, and the B.T.L. models have an excellent performance in this respect. This is mainly due to the dead-beat action which saves the time taken in watching the oscillations of the pointer

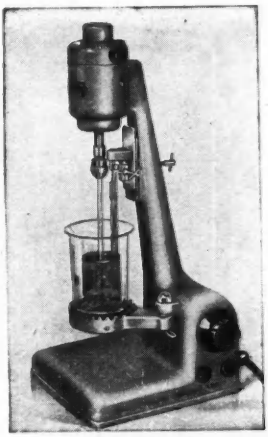
to the surface to which it is attached, and a calibrated adjustment on the reference gauge is used to match the two gauge frequencies before and after applying the stress. There is also on show a full range of models of the Weston standard cells which, because of the constancy of their e.m.f., are a recognised reference standard for potentiometric electrical measurements.

EVERETT, EDGCUMBE & CO., LTD., Colindale, Works, Hendon, London, N.W.9, is showing several new designs of portable scientific instruments, as well as working examples of process timers, operation graphers, and "Inkwell" graphic instruments. There is a hand tachometer with ranges 0/500 and 0/3000 r.p.m., and an auto-photometer for the accurate measurement of light intensity. One of the major new developments of this firm is the "Vampire" AC test set, in which are provided facilities for AC amps., volts and watts measurement without the use of any special connections, the various functions being selected by means of a switch. There is also a comprehensive test kit to cover DC measurement as well as AC. This latter includes a 500 volt DC insulation tester with conductivity range. All these exhibits are being shown on the stand of the firm's agents in Denmark, M. B. Cohn A/S.

Electrical Equipment

THE BRITISH THOMSON-HOUSTON CO., LTD., in collaboration with its several Danish agents, is exhibiting a comprehensive range of B.T.H. electrical equipment. This includes horizontal and vertical variable speed A.C. commutator motors, ½ h.p. die-cast frame motors for horizontal and vertical mounting, various types of fractional horsepower motors, thrustors, suds pumps, electronic motor speed control units, electronic timers, photo-electric relays, and other electronic apparatus, including a magnetron as used in B.T.H. marine radar equipments. On view are photographs illustrating B.T.H. marine radar, and the latest developments in silicon and germanium crystal rectifiers.

METROPOLITAN-VICKERS ELECTRICAL CO., LTD, is exhibiting, in an extremely wide range of equipment, a model of a small rotary vacuum pump. This standard pump, many thousands of which have been manufactured, has been fitted with a glass end plate in order that the movement of the vanes and the circulation of the oil can be seen while the pump is in operation. Also shown is the Metrovac oil diffusion pump for use with high-vacuum apparatus. Then there is the EM3 electron microscope. This employs a three-lens image-forming system,



Industrial electrolytic analysis apparatus by Baird & Tatlock, Ltd.

which reduces the overall size of the microscope and increases the range of magnification that can be obtained. The movement of the mechanical stage allows the whole of the specimen to be scanned and also provides for stereoscopic work. The illuminating system employs a new design biased-grid electron gun which gives sufficient intensity to allow magnification up to 100,000 times to be used directly. The gun is supplied with high voltage up to 100 kV from an oil-immersed high-frequency DC set of new design. Stabilisation of the lens current and the high-tension supply is effected electronically, no supply batteries being required.

THE GENERAL ELECTRIC CO., LTD., of England, is exhibiting a wide range of products, and it is also interesting to note that the company has for some time had two interesting permanent exhibits in the city of Copenhagen in the Dioptrion lanterns which light the streets and the many trolleybuses equipped with G.E.C. electric motors and control gear. The model being shown of a Sherwen vibrating screen is representative of the mining and materials handling plant manufactured by the company's Fraser & Chalmers Engineering Works. Various types of infra-red heating equipment can be seen on this stand as well as lamps of every description from the 5000 watt gasfilled projector for motion picture photography to the 32 watt exciter lamp for use with photocells for sound reproduction. Other lamp exhibits include 4 ft. and 5 ft. fluorescent

Portable pH meter by Marconi Instruments, Ltd.

tubes and a 125 watt black glass lamp of the type frequently used for detecting forgeries or the faking of works of art. Then, there are being exhibited on the G.E.C. stand many types of electronic measuring instruments, also a representative display of ventilating equipment manufactured by Woods of Colchester, an associate company of the G.E.C.; this latter exhibit includes aerofoil fans, man cooler and propeller fans.

MARCONI INSTRUMENTS, LTD., St. Albans, has included in its display at Copenhagen a number of instruments for industrial and laboratory use. Its Danish agents are Sophus Berendsen, A.S. Among the instruments being shown is the Video Oscillator, Type TF 885. This is an AC mains operated heterodyne oscillator covering the range 20 c/s. to 5 mc/s. in two bands and having a maximum direct output of 1 watt into 1000 ohms (31.6 V). Then there is its *p*H meter Type TF 717A, which is a sensitive electrometer of very high input resistance, arranged for AC mains operation and suitable for the measurement of small potentials developed by electro-chemical action.

Also on show on the Marconi Instruments stand is its moisture meter Type TF 874, which determines the percentage moisture content of hygroscopic materials by a direct current method, relating moisture content to electrical conductivity. Another *p*H instrument is its recorder Type TF 886, which is entirely AC mains operated and is for the determination of the *p*H of aqueous liquids by electro-chemical means.

A thickness meter, TF 884, on the Marconi Instrument stand is for use in determining the thickness of plating, paint, or other covering deposited on a ferrous base, without causing damage to the surface. The meter is AC mains operated and no valves are used, its functioning depending directly upon reluctance variation in a magnetic circuit. The test head, which is stowed within the instrument for transit, has a smooth spherical end in order that it may be used on other than plane surfaces. The moving coil indicating meter is calibrated in thickness over a total range of 0-0.01 in., with the first part of the scale divided to 0.0001 in.

THE AUTOMATIC COIL WINDER & ELECTRICAL EQUIPMENT CO., LTD., Winder House, Douglas Strett, London, S.W.1, is including in a wide range of electrical equipment and measuring instruments the Avo electronic testmeter. This is a 49-range measuring instrument of great versatility and high accuracy, designed to make most of the measurements encountered in the field of electronics. It consists basically of a highly stable DC valve millivoltmeter substantially independent of mains voltage fluctuations and valve characteristics, together with subsidiary circuit switching to give the 49 ranges.

QUICKFIT & QUARTZ, LTD., "Triplex" Works, King's Norton, Birmingham 30, has at Copenhagen exhibits covering its two main fields of production, namely laboratory apparatus incorporating interchangeable conical ground glass joints, and industrial plant in glass.

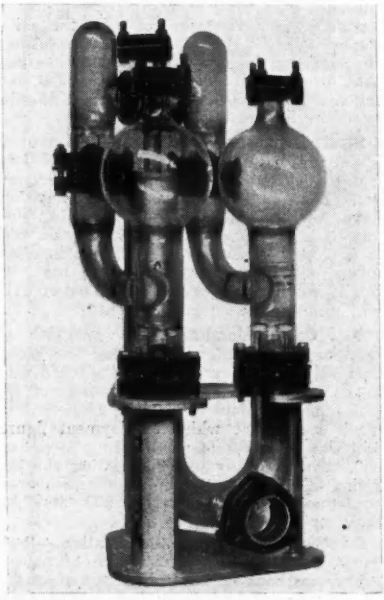
Thickness meter by Marconi Instruments, Ltd.

A New Glass Pump

Impervious to Most Acids and Alkalis

AN important development in pump design has been introduced by Tungstone Products, Ltd., with the demonstration of a new glass pump. Made of Pyrex borosilicate glass, it makes practicable the safe conveying of all acids and alkalis of pH—8 or less (concentrated hydrofluoric and glacial phosphoric acids excepted).

The use of glass is made possible by the absence in Tungstone pumping equipment of all centrifugal and reciprocating stresses. The pump has the additional advantages of visibility, cleanliness, and a capacity for withstanding temperatures up to 200 C. It can be flushed with steam, hot water, or hot acid solutions. With a capacity (4 ft. inlet head) of 300 gal. per hour, at up to 50 lb. per sq. in. delivery pressure, and requiring 1½ to 4½ cu. ft. of free air per min., the Tungstone pump weighs 54 lb., and measures 13 by 13 in. by 30 in. overall height.



Typifying the increasing use of glass in larger-scale equipment, this Tungstone pump employs highly impervious Pyrex material and involves little danger of shock of impact damage

D

Increased Fire Losses

Appeal to Volunteers

COMMENTING on the recently published £2 million increase in fire losses during the last six months (as compared with the corresponding period of 1947), Mr. W. H. Tuckey, O.B.E., director of the Fire Offices' Fire Protection Association, says that it is not possible at present to obtain a true picture of the situation because of the absence of comprehensive statistics. Moreover the reduced purchasing power of the pound sterling makes comparison with pre-war figures misleading; nevertheless this continued high rate of fire wastage is serious and disturbing.

It was with a view to attacking the problem from all angles that the F.P.A. was recently formed, and is co-operating with local authorities, industrial fire brigades, insurance companies and research organisations, and the Government, in its efforts to reduce losses.

Another factor which affected fire losses was the altered trend of volunteer spirit. While the industrial and private fire brigades were stronger than before, a number of public fire brigades which depend on volunteer or retained firemen (*i.e.*, men who are paid a small retaining fee) were undermanned. This is particularly apparent in small towns and the country areas. Industry had during the war spread into many of those districts and the risks had increased correspondingly.

BIG CELLOPHANE EXPANSION

PLANS for a $4 million addition to the company's Cellophane plant at Shawinigan Falls, Quebec, were announced last week by Canadian Industries, Ltd. When completed, the enlarged facilities will enable the plant to increase production by 200 per cent over its pre-war output, said the announcement. Work on the new project will begin immediately and is expected to be completed in 1951. It will entail both building extensions and installation of new machinery.

The plans announced are in addition to an earlier expansion and modernisation programme, launched at the end of the war, which will be finished next summer. According to the announcement, three-quarters of the Cellophane produced at Shawinigan Falls is used in the Canadian food industry.

The original "Cellophane" plant went into production in April, 1932. In addition to the Cellophane works, C.I.L. also operates at Shawinigan Falls plants producing caustic soda and chlorine, hydrogen peroxide and trichlorethylene. A new cellulose sponge plant is expected to be in operation next year.

Home News Items

Airmail to Europe.—Since July 1 all letters, letter packets and postcards for Europe, except Germany, Poland and Iceland, prepaid at the ordinary international rate of postage, have been forwarded by air whenever this offered earlier delivery. During the first complete week of this "all-up" scheme, the weight of mail despatched was 56,100 lb.

Factory Fire Averted.—Prompt action on the part of the works fire picket saved tanks of inflammable liquids, recently, at the Monsanto Chemical Works, South Docks, Sunderland, when he extinguished the blaze after some waste oil in a creosote tank caught fire from a spark from a nearby oxy-acetylene burner. When the fire brigade arrived the blaze was already out.

Overseas Economic Surveys.—Two further Overseas Economic Surveys, in the series published for the Export Promotion Department of the Board of Trade by H.M. Stationery Office, will be available shortly. The survey relating to Iran was published on Friday, price 1s. The publication date for the survey of the U.S.A. is Friday, September 24, price 3s. 6d.

Petrocarbon Work Continues.—Settlement has been reached of the strike which recently interrupted the constructional work on the site of the Petrocarbon plant at Carrington, Shropshire. The worker, whose dismissal was the subject of the dispute, was reinstated and union officials have given assurances that care will be taken to preserve discipline and smooth labour relations.

Chemical Employees in Czechoslovakia.—A steady increase in the number of persons employed in the chemical industry of Czechoslovakia is shown in the *Ministry of Labour Gazette* for August, 1948. Figures based on data from *Statisticy Zpravodaj*, monthly journal of the National Statistical Office of the republic showing the following comparison:—1946: June 1, 65.5; December 1, 68.3; 1947: June 1, 75.9; December 1, 81.9.

The Film in Scientific Research.—The Science Committee of the Scientific Film Association has arranged a one-day conference, to be held on October 12, from 10.30 a.m. to 9.30 p.m., at the Royal Institution of Great Britain, 21 Albemarle Street, London, W.1, on "The Film in Scientific Research." At the morning session Prof. G. I. Finch (Imperial College of Science and Technology) and Prof. M. Florken (University of Liège, Belgium) will speak from the chemistry angle. Further details are obtainable from the honorary secretary, Science Committee, Scientific Film Association, 34 Soho Square, London, W.1.

Cement from Germany.—Substantial quantities of cement and cement clinker from Germany are being imported by arrangement with the Cement Makers' Federation. These will augment supplies available for areas normally served by British cement, according to a Ministry of Works announcement. First shipments will go to Scottish ports, and are expected soon.

Coal Below Target Figure.—Despite a small increase last week of the output of the mines—to 3,815,100 tons—the total coal output of 4,026,600 tons again fell short of the level required to reach 211 million tons by the year's end. Opencast production fell to 211,500 tons. A weekly output of about 4,300,000 tons would now be required if the year's target is to be attained.

Under-Production in South Wales.—The Joint Industrial Council of the Welsh plate and sheet industry decided at its meeting in Swansea this week to form a committee to examine production problems in the mills. Captain Leighton Davies, who was elected the employers' chairman, had stated earlier that production, compared with 1939, had fallen by about 30 per cent and some 45 mills were idle because of labour shortage.

Steel Expansion Continues.—In spite of threats of nationalisation, the Deeside steel factory developments of John Summers and Sons, Ltd., are proceeding well. Foundations have now been laid for a new smelting shop and building of two new blast furnaces will, it is hoped, begin shortly. These improvements will increase output by 25 per cent, but it will be four or five years before they will mean increased employment.

New Cold Reduction Plant.—An official of the Steel Corporation of Wales has stated that within the next nine months or so work in connection with the installation of the cold reduction plant at Trostre, Llanelly, will reach a stage at which employment figures will rise to 2200, compared with the present 600. The company was considering the provision of a hostel or camp for the temporary accommodation of between 200 and 300 craftsmen.

Rubber Research and Organisation.—Problems dealing with the resilience of natural rubber methods of hardening, and means of packing in smaller bales, are contained in the rubber departments section of the Imperial Institute report for 1947. A pilot plant for the preparation of dry rubber by continuous process has been erected at the institute for experiment; when the work is completed and satisfactory, the plant will be dismantled and shipped to Malaya.

PERSONAL

MR. A. J. QUIG has been appointed a deputy chairman of Imperial Chemical Industries, Ltd. Mr. Quig, who is 56, was educated at Glasgow High School. He joined Nobel Explosives, Ltd., in 1907. During World War I he served in France and was wounded at the battle of the Somme, and later went out to India as adjutant of the 1st H.L.I. In 1926, shortly before the formation of I.C.I., Mr. Quig was appointed manager of Nobel Chemical Finishes, Ltd. Ten years later he became chairman of the Paint & Lacquer Group—now I.C.I. Paints Division. He was elected to the main board of Imperial Chemical Industries in 1940, and appointed commercial director in 1944. The other deputy chairmen are SIR FREDERICK BAIN, SIR WILLIAM COATES, and MR. J. ROGERS.

Mr. A. J. Quig

MR. SAM C. WHITEHOUSE, assistant manager of the Kobuta, Pennsylvannia, chemical plant, of Koppers Company Inc., has been appointed export manager of the chemical division's sales department. From October, 1945, to November, 1946, he was loaned to the Reconstruction Finance Corporation, being made styrene manager and assistant production manager for the entire programme of the Office of Rubber Reserve.

At the meeting of the Grand Council of the Federation of British Industries recently, SIR ROBERT SINCLAIR, K.C.B., K.B.E., was appointed deputy president of the federation.

PROF. GUSTAVO COLONNETTI, president of the Italian National Research Council, has been in London for the past fortnight, under the auspices of the British Council. He came here to study the organisation of scientific research, especially the methods by which the British Government is assisting and sponsoring research, and visited the National Physical and Chemical Research Laboratories at Teddington, the Department of Physics at Oxford and the Atomic Energy Research Station at Harwell. Prof. Colonnetti is, in effect, the head of the whole structure of scientific research in Italy. In 1920 he founded the Institute of Mechanics of the Turin Polytechnic and until 1939 was director of the Institute and Professor of Engineering in the University of Turin.

MR. WILLIS ROXBURGH, a director of Albion Light Metal Products, Ltd., Glasgow, has been unanimously adopted the Unionist Party's candidate in the Parliamentary by-election in the Gorbals Division of Glasgow. He is 35, was born in Ayrshire, and during the war served in the RAF as squadron leader.

Chemistry Training

Three New Courses at the Cass Institute

THE new session of the Sir John Cass Technical Institute begins this month with an interesting and comprehensive syllabus. In the department of chemistry, three courses are of special contemporary interest.

The first consists of a series of twelve lectures on spectroscopic analysis by S. Judd Lewis, D.Sc. (Lond. and Tübingen), F.R.I.C., and T. J. Bowen, M.A. (Oxon.), A.R.I.C., which will be held on Friday evenings. The fee for the course is £1.

Microchemical analysis by David W. Wilson, M.Sc. (Belfast), A.R.I.C., is the subject of the second course of ten lecture-demonstrations suitable for analysts and advanced students of chemistry. These will be given on Thursday evenings, the fee being £1 for the series.

The third course forms the first part of a two-year scheme of lectures on advanced organic chemistry to be given by A. G. Lidstone, M.A. (Cantab.), B.Sc. (Lond.); T. Henshall, M.A., D.Phil. (Oxon.), and D. H. R. Barton, B.Sc., Ph.D. (Lond.), A.R.C.S., D.I.C., to be held on Wednesday evenings, at a fee of £2. The outline for the present session will deal with: Alkaloids, carotenoids; anthocyanins and anthoxanthins; sterols, bile acids, sex hormones, etc.; vitamins; antibiotics; haemoglobin and chlorophyll; nucleic acids. Part II will be given during the 1949-50 session.

Repairs and rebuilding of the institute, damaged during an air raid in 1940, are in progress.

Chemical Trade Prospects in Pakistan

Britain Holds the Bulk of the Market

ACCORDING to recent reports on the chemical market in the new Dominion of Pakistan, prepared by the U.K. Trade Commissioner at Karachi and published by the Board of Trade, the small pre-war demand in the areas now forming the state is likely to increase considerably if and when the Government implements its programme of industrial and agricultural expansion. Part of this demand will probably be met by the erection of local works which will in the main process domestic raw materials. However, there is bound to be much scope for foreign manufacturers of chemicals, particularly of more complex compounds, the making of which is out of the question in Pakistan for a very long time to come.

In spite of import restrictions, the U.S.A. has captured the position formerly held in this market by Germany and Japan, and imports are also coming in from France, Belgium and Italy. However, the lion's share of the market still goes to British manufacturers, who now ship about the same volume as before the war.

Despite the fact that Pakistan is still a "sellers' market," complaints have been made that British chemicals are too highly priced and that their packing is very bad. However, if prices can be kept down and delivery terms observed, and packing improved, U.K. chemical manufacturers should be able to hold their own in the Pakistan market.

Pakistan is still largely an agricultural country. Its mineral resources, while believed to be extensive, have so far been little exploited. In fact, only gypsum, salt and chrome ore are being won at present. There are deposits of inferior coal, and iron ore occurs in Baluchistan. There is a small and declining production of oil in the West Punjab at Attock, but it is hoped to discover further oil deposits as a result of geophysical survey work taking place at present. There is much scope for the development of hydro-electric power.

The industrialisation of this Dominion was considered at a conference held towards the end of last year in Karachi, the capital. A tentative building scheme includes, *inter alia*, the erection of three oil refining and hydrogenation plants, 15 tanneries, one match factory, two cement plants, 20 plants making glassware, two soap and glycerine factories, one plant for the production of drugs from medicinal herbs, and several chemical works.

Regarding the chemical production, the conference discussed plans for the erection of three caustic soda plants in the West Punjab, the N.W. Frontier Province and East Bengal, with a planned daily output of ten tons, two soda ash plants at Karachi and Khewra with an annual capacity of 40,000 and 10,000 tons respectively; four sulphuric acid units at Chittagong, Khewra, Karachi and the N.W.F.P., with an output of 10 tons a day. In addition, a plant for the manufacture of calcium carbide, cyanine and allied products is recommended to be established at Kalat. The scheme also contains provision for the establishment of fertiliser factories.

FERTILISERS IN ITALY

DURING the 1947-48 campaign, 866,000 tons of phosphate fertilisers were distributed in Italy. This compares very favourably with the 200,000 tons in the 1945-46 period, but is still 36.5 per cent short of the 1,300,000 tons used before the war. As regards other types of fertilisers, such as sulphate of ammonia, calcium cyanamide, nitrate of calcium, and sodium nitrate, their consumption reached 488,300 tons, or 20 per cent short of the 611,500 tons pre-war. The factor that has been particularly responsible for the slower post-war consumption of fertilisers in Italy, it is stated, is the discrepancy between the cost of the fertilisers and the price which farmers were able to command for their produce.

PYRETHRUM EXPERIMENTS

THE Kenya Board of Agriculture has recently been informed of the results of a series of experiments carried out over the last nine months with pyrethrum powder as an insecticide to protect stored grain. They show that pyrethrum retains its properties as an insecticide over a longer period than was previously believed if it is mixed in grain bags where it is not directly exposed to light and air. Very effective protection against weevils was given over a period of 8½ months by mixing 1 lb. of ordinary pyrethrum powder into each sack of grain. At the end of that time treated and untreated sacks of wheat were valued, the treated sack being assessed at nearly double the untreated sack, which had suffered from insect damage.

Overseas News Items

Pain Killer.—Discovery of a new pain killing drug many times more potent than cocaine, was claimed at the 114th national meeting of the American Chemical Society.

Economics of Atomic Energy.—The Teaching Institute of Economics of the American University, Washington, plans to concentrate all its facilities during the next 12 months to provide a comprehensive study of the economic aspects of atomic energy.

Award for Biggest Improvement.—Employees of the Montreal plant of Monsanto (Canada), Ltd., received a plaque and individual awards for plant improvements made during the past year. Monsanto have 17 plants, and the plaque is awarded annually to the one which shows the biggest improvement during the period.

Uranium Mine Disaster.—Twenty-four forced labourers are reported to have been killed in an accident in a uranium mine controlled by the Russians at Ane in the Soviet zone near the Czech frontier, according to a Berlin message. Water has flooded the mine, and eight other workers said to be missing have been given up for lost.

Oil Drilling in Central Africa.—A report in the Dutch economic daily *Economische Voorlichting*, says that drilling for oil is taking place in the neighbourhood of Lake Alberta where oil seepages were discovered some 20 years ago. The operations are said to be taking place on the territories of Uganda and the Belgian Congo and secrecy is being preserved regarding results.

Declining Belgian Coal Production.—Belgium's coal output, which until recently amounted to about 93,000 metric tons per day, has recently declined to approximately 89,000 tons. The causes for this decline are chiefly absenteeism and the fact that many foreign miners find it difficult to adapt themselves to Belgian conditions. Of 45,000 Germans who worked in the Belgian mines last year, only about 3500 are now available.

New Magnesium Fertiliser.—The Molina di Ledro factory near Trent in Italy, has launched a new fertilising product called Fim Fertiliser. This is based on phosphorus (5 per cent), magnesium (hydroxide 14 per cent, free oxide 4 per cent), and calcium. Argument for and against magnesium fertilisers has been going on in Italy for some time, but the Molina factory is confident enough in its new product to start large-scale distribution. Free samples are being sent to farmers.

Canadian Tin Plant for Chile.—A complete second-hand tin plant was shipped in August from Montreal to Valparaiso. The plant was formerly located at Sault St. Marie, Ont.

Prague Fair.—Russian exhibits are the principal feature of the autumn trade fair now being held in Prague. Machines being shown by the Soviet Union vary from aircraft and omnibuses to a drilling apparatus capable of boring to a depth of 3000 metres.

Groundnuts Hold-Up.—Some 262,800 tons of groundnuts, enough to make at least 100,000 tons of margarine, are stated to be waiting to be gathered in Northern Nigeria, but unless new locomotives and rolling-stock arrive to reinforce the 700-mile narrow-gauge, single track railway to the coast, it will take a year to move the nuts.

New Mica Mill.—Completion is expected this autumn of a new mill at Newport News, Va., for the manufacture of sheet and ground mica by the Mica Co. of Canada, Inc. When completed the company intend to remove plants at Massena, N.Y., and Asheville, N.C., to the new location, where operations will be concentrated in future.

Oil Palm Prospects.—The expectation of a strong demand for some years for vegetable oils and copra and palm products was reported by Sir Eric Macfadyen, chairman, in his address at the annual general meeting in London of the Straits Plantations, Ltd. It was proposed to resume work on the expansion of the Sungei Samak oil palm estate, where first clearings gave results which showed that the soil grows first-rate palms.

More Japanese Steel.—According to official Japanese sources, output of steel ingots and sheets amounted to 177,000 tons and 217,780 tons, respectively, in the first quarter of this year, the highest figures since the end of the war. The target for steel sheets was reached because of larger supplies of electric power, but inadequacy of iron-ore imports and of coal from the Russian authorities has made it impossible to fulfil the ingot target.

Sicilian Sulphur Dwindles.—Sicilian sulphur mines during the financial year 1946-47 produced only 100,407 tons of sulphur. Ever since 1900 when the output amounted to some 500,000 tons the production of sulphur in Sicily has been declining in the face of competition from the U.S.A. Sulphur realises about $22 outside Italy; its guaranteed price in Italy is equivalent to about $54, and even this does not cover the costs of production.

Nitroglycerine Explosion

Workers' Timely Escape

AN explosion occurred at the I.C.I. factory, Ardeer, Ayrshire, on September 13. Some employees were injured by flying debris, but the injuries were of a minor character. Safety measures and prompt action enabled three men working where the explosion occurred to make their escape. The explosion took place in the No. 3 Hill, which is one of the dispersed production units for the manufacture of nitroglycerine. A company official stated that the man in charge of the nitrator had just added 200 lb. of glycerine when he saw red fumes issuing from the nitrator plant. Recognising this danger signal, he immediately called to the two men working the separator, and they escaped. The nitrator exploded first, followed shortly afterwards by the separator.

INCREASING CHEMICAL MANPOWER

AN interesting comparison of the numbers of persons employed over the period mid-1939 to June, 1948, appears in the industrial analysis tables published in the Ministry of Labour gazette for August, 1948. The following extract shows a steady upward trend since 1947 for the chemical and related industries as a whole. Figures are shown (in thousands) in the following sequence, mid-1939; mid-1945; mid-1947; June, 1948: Coke ovens and by-product works: 12.4; 12.7; 13.7, 14.4. Chemicals: 124.8: 157.5; 187.9; 192.7. Explosives: 37.1; 168.1; 34.6; 33.6. Paint, varnish, etc.: 26.9; 23.4; 30.0; 31.8. Oil, glue, soap, ink, etc.: 83.2; 75.8; 81.6; 85.0. Total chemicals, 284.4; 438.1; 347.8; 357.5.

Swifter Telegrams

A revolution in the telegraph system of Great Britain has taken place during the past four years.

Formerly a large proportion of messages had to be transmitted at intermediate offices. A telegram from Brighton to Dumfries, for example, would be transmitted three times: Brighton to London, London to Glasgow, and Glasgow to Dumfries.

Under the new switching system, Brighton is provided with a direct teleprinter circuit to each switchboard, and the telegraphist at Brighton requiring Dumfries, would call Glasgow switchboard and ask by teleprinter to be extended to Dumfries. Connection is made with cords and plugs in the same way as telephone calls are made on a telephone switchboard.

Portuguese Wolfram Decline

Continuance of German Direction?

THE Portuguese wolfram trade has fallen away from wartime boom proportions almost to a moribund condition. At the present price of 105s. to 110s. per unit, Portugal cannot compete in world markets and production will be restricted to the Beralt and Borralha mines and perhaps to the group of mines developed by the Companhia Mineira de Portugal, writes the Oporto correspondent of the *Mining Journal*.

The report alleges that the last-named group, which was developed by the Germans during the war, has slipped through the net of the Allied Commission now liquidating enemy mines, although the commission is said to have "some sort of right" to supervise sales and output of the Cia. Mineira. However, since the group's power station at the Vale das Gatas mine—which is reported to have cost the Germans at least £50,000 to erect—has recently been gutted, it is likely that output at this important centre will be impeded for a long time.

The matter, says the Oporto correspondent, should not be allowed to rest there and should German interests "have got away with it" again in one way or the other, action should be taken without delay to liquidate any German influence in the Portuguese wolfram mining industry.

[The price of wolfram, quoted in London this week to have risen 2s. 6d. to 160-107s. 6d. nominal per unit, c.i.f., European ports.]

CANADIAN WOOD WASTE INDUSTRY

CONTRACTS have been signed for the construction of a "Plaswood" plant at South Nelson, N.B., the first such plant in Canada, it is indicated in a joint announcement by Mr. Alfred H. Paradis, Montreal, Mr. H. I. Hymans, of Detroit, and Mr. J. L. O'Brien, of South Nelson. Plaswood, it is explained, is the result of 10 years' research and development in the United States. The process converts all kinds of wood waste into a wide range of wood products through the use of special drying equipment and the mixture of a synthetic resin. The right to the process in Canada will be acquired by a new company to be known as Plaswood Corporation of Canada, Ltd. The South Nelson plant, which is expected to be in operation within six months, will be the first to be licensed by the new company. Other plants are expected to be built throughout Canada.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

R. A. CLEMENTS (LONDON), LTD. (formerly REGINALD MAURICE, LTD.), (M., 18/9/48.)—August 12, £3,000 (not ex.) mortgage to Lloyds Bank Ltd.; charged on lease of 5 Blenheim Street, Westminster. *Nil. April 23, 1947.

COPPER & ALLOYS, LTD., West Bromwich. (M., 18/9/48.)—August 4, further charge, to N. M. Rothschild & Sons further increasing the limit secured by a charge dated July 19, 1940, and deeds supplemental thereto from £180,000 to £360,000; general charge. *£80,000. July 16, 1947.

Receivership

GOLDEN VALLEY CHEMICAL WORKS, LTD., 20 Gloucester Road, Stroud. (R., 18/9/48.) Mr. John G. Sperni, 36 Doughty Street, W.C.1, was appointed receiver and manager on July 23, 1948, under powers contained in debentures dated July 19, 1947.

Company News

The name of **Midland Paint & Varnish Co., Ltd.,** 34 Market Place, Long Eaton, has been changed to **Eaton Paint & Varnish Company, Ltd.,** as from August 11, 1948.

The nominal capital of **Indo-British Industries, Ltd.,** 30 Sussex Place, London, W.2, has been increased beyond the registered capital of £100, by £900 in £1 ordinary shares.

The nominal capital of **Quickset Products, Ltd.,** 67-69 Tower Bridge Road, London, S.E.1, has been increased beyond the registered capital of £600 by £2400 in £1 ordinary shares.

The nominal capital of **Rushborne Developments, Ltd.,** The Manor House, Feckenham, Worcs., has been increased beyond the registered capital of £2000 by £18,000 in £1 ordinary shares.

The consolidated accounts of the **Triplex Safety Glass Co.** for the year ended June 30 show current liquid assets of £1,050,891 (compared with £919,518 last year) and liabilities of £224,945 (£151,670). Revenue reserves and undivided profits are £284,783 (£266,358).

New Companies Registered

Tudor Jones (Chemists), Ltd. (458,556).—Private company. Capital: £2000. Manufacturers of chemicals, gases, etc. Directors: G. T. Jones, 10 Springfield Crescent, West Bromwich; and C. H. Smith. Secretary: G. T. Jones.

M. L. Alkan, Ltd. (458,647).—Private company. Registered September 9. Capital £10,000. Manufacturers of and dealers in chemicals of all kinds, etc. Directors: Max L. Alkan and Mrs. K. Alkan, both of 15 Courtleigh Bridge Lane, N.W.11. Secretary: G. L. Castle.

Redman Chemical & Physical Instruments, Ltd. (458,654).—Private company. Registered September 9. Capital £100. Chemical, electrical and mechanical engineers, manufacturers of and dealers in chemical, physical, electrical and mechanical apparatus, equipment, etc. Directors are: Henry C. Redman, Florence E. Redman and John C. Redman. Reg. office: 53 Canning Road, Wealdstone, Middlesex.

Chemical and Allied Stocks and Shares

STOCK markets remained cautious, owing to international uncertainties, and, with buyers holding off, values in most sections eased, although little selling was reported. British Funds were unable to move against the general trend, including the nationalisation stocks, 3 per cent Transports receding to 99 1/16, after touching the new high level of 99¼. The TU Conference had little effect on sentiment, but there was relief that indications are that no legislation is likely to limit profits and dividends. It is now generally recognised that leading industrial companies have loyally followed the dividend limitation request. Moreover, results which fall to be published over the next six months will in many instances be the first to reflect the reduced profits of a wide range of companies owing to lower retail prices in the home market and the reduced spending power by the public.

Imperial Chemical have been firmer at 44s. 4½d. with the new shares better at

3s. 3d. premium, scattered selling having now ceased on the part of those who did not wish to pay the first call of 20s. These new shares will not become fully paid (they were issued at 40s. 6d.) until October 28 when the final call of 20s. 6d. is due. The yield of nearly 4½ per cent on Imperial Chemical still seems attractive when compared with the return on some other leading industrial shares, and the new shares are a slightly cheaper purchase than the old shares.

Monsanto Chemical 5s. shares have been firm at 58s. 9d., and B. Laporte 5s. ordinary were again 20s. 6d., with Albright & Wilson 5s. shares at 29s. Amber Chemical 2s. shares changed hands around 9s. 9d., and Fisons around 59s. Boake Roberts 5s. shares transferred at 30s., while W. J. Bush 5 per cent preference marked 27s., and Burt Boulton ordinary 25s. 3d. British Glues & Chemicals 4s. ordinary have further strengthened to 21s. following news of the company's developments in Canada. Amalgamated Metal shares were firmer at 19s. 7½. the yield of rather more than 5 per cent bringing in buyers. Moreover, in other directions, Borax Consolidated at 60s. have held their recent rise, while British Match were 35s. 6d., and British Oxygen 99s. 4½d. Elsewhere, De La Rue at 40s. turned dull with the yield now fully 6 per cent on the basis of last year's 50 per cent dividend on these 5s. shares. At 76s. 6d., Turner & Newall remained steady. United Molasses were 47s. 9d., Lever & Unilever 49s., and General Refractories 10s. shares were 22s. yielding 4½ per cent, last year's dividend having been 10 per cent. British Drug Houses 5s. shares continued to be quoted at 9s.

Despite expectations that the Government will shortly introduce its Nationalisation Bill, iron and steel shares were generally fairly steady, movements not exceeding more than a few pence. Guest Keen have eased to 47s. 9d. United Steel were 28s. 3d. at which the yield is nearly 5⅝ per cent, and the market expects forthcoming results to show maintenance of the dividend at 8 per cent. Dorman Long were 31s., but Stewarts & Lloyds eased to 54s. 6d., and Thomas & Baldwins 6s. 8d. ordinary were 14s. 6d. Colliery and kindred shares have been firm and more active on latest market estimates of their ultimate compensation "break-up" values. Staveley have been particularly prominent at 83s. 6d. on renewed market expectations that the forthcoming capital repayment by Doncaster Amalgamated Collieries (in which Staveley has a 40 per cent interest) will mean later on a special return to Staveley shareholders. The market is assuming, however, that Staveley is likely to retain a good part of its cash resources because of the possibility of further acquisitions in the chemical industry from time to time. In other directions, Boots Drug 5s. ordinary were firmer at 52s. on the assumption that business will expand as a result of the National Health developments. Oil shares have been uncertain with Shell at 75s. 7½d., and Anglo-Iranian £7⅞

British Chemical Prices

Market Reports

THE absence of any important developments in the home industrial chemicals market leaves the general position more or less unchanged. Values throughout are steady and the demand from the leading industrial consuming industries has been sustained. Inquiries for shipment, too, have been fairly widespread and the export market for chemicals remains at a satisfactory level. In the soda products section there is a ready market for chlorate of soda and bichromate of soda, while the demand for soda ash continues in excess of the quantities available. In other directions there is a good call for hydrogen peroxide, acetone, formaldehyde and arsenic and an active demand has been maintained for the lead oxides. In the coal-tar products market business continues on a good scale with buying interest sustained in cresylic acid, crude carbolic acid and pitch.

MANCHESTER.—Steady or firm price conditions continue in virtually all sections of the Manchester chemical market, and in respect of demand, trading has been satisfactory during the past week. Pretty well all classes of alkali and ammonia products are being called for in good quantities, while a full absorption of available supplies of most of the potash chemicals is also reported. Current inquiry covers a fairly wide range of other light and heavy products from domestic consumers, and a steady trade is passing on overseas account. Considering the time of the year, the movement of supplies of fertilisers is fairly satisfactory, and a continued steady demand for the light and heavy tar products is a feature.

GLASGOW.—There has been little change in the Scottish chemical market during the past week. Demand has been fairly well maintained over the whole range of chemicals, and prices have remained steady. The export market continues to show activity and produces a steady flow of inquiries and a fair percentage of orders.

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NEGLECTED NEEDS OF INDUSTRY

THE Grand Council of the Federation of British Industries last week heard the report of the president, Sir Frederick Bain, on the discussions which he had had with Sir Stafford Cripps on the subject of increasing industrial productivity. The council endorsed the action taken by the president and decided to appoint at once a production committee to advise what further steps the federation should take. At the same time, the council recorded its view that success would be inevitably limited so long as present restrictions on capital expenditure were maintained. Even within the limits prescribed by the balance of payments problems, industry could not safely be left much longer as the residuary legatee, whose claims for capital expenditure were the last to be met.

Deep Sea Exploration

A new expedition to explore the ocean depths in the Gulf of Guinea is being undertaken by Prof. Auguste Piccard and his assistant Prof. Max Cosyns. The bathysphere —a 10-ton steel diving-bell—will be lowered off Cape Verde. It is hoped to study the effects of cosmic rays at great depths, and Prof. Cosyns will also examine the chemical composition of the sea at various depths.

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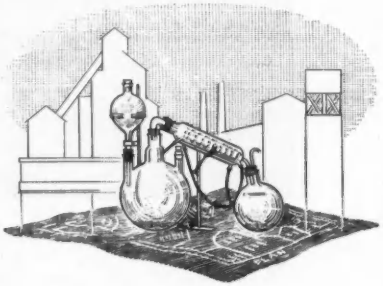

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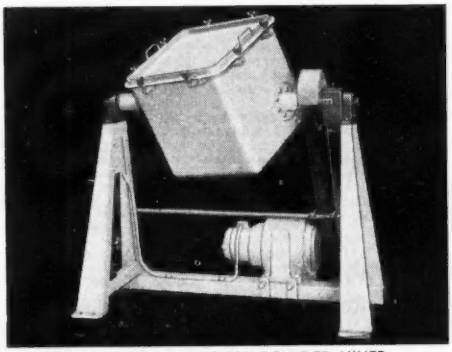

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SITUATION VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

BRITISH ELECTRICITY AUTHORITY
(South Eastern Division)

ASSISTANT CHEMIST, LITTLEBROOK POWER STATION

APPLICATIONS are invited for the position of **Assistant Chemist** for the above Generating Station.

Applicants should hold a B.Sc., or equivalent degree in Chemistry, and have had experience in the analysis and testing of coal boiler deposits, oil and water associated with high-pressure and high-temperature steam generating plant.

Salary will be in accordance with Class "J" of the National Joint Board Schedule, which will be as follows, dependent on experience and qualifications:—

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Applicants should not be more than 45 years of age.

Forms of application may be obtained by sending a stamped addressed foolscap envelope to the **Divisional Secretary, British Electricity Authority, South Eastern Division, British Electricity House, Lower Ham Road, Kingston-upon-Thames.**

Completed application forms, clearly endorsed, must be returned to the above address not later than 8th October, 1948.

SITUATIONS VACANT

ANALYTICAL Chemist required for development of new methods. Graduate with experience preferred, but young Graduate wishing to specialise in Analytical Chemistry would also be considered. The position offers a sound and progressive opening with an important firm of chemical manufacturers. Good salary and pension scheme. Reply to Box No. 2702, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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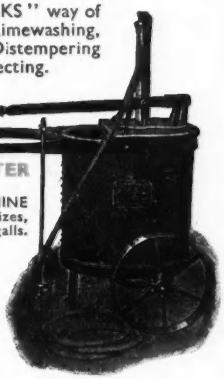

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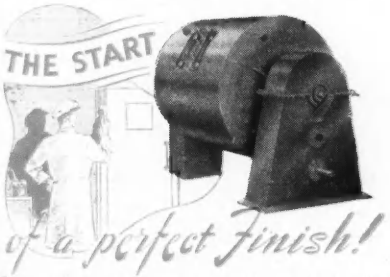

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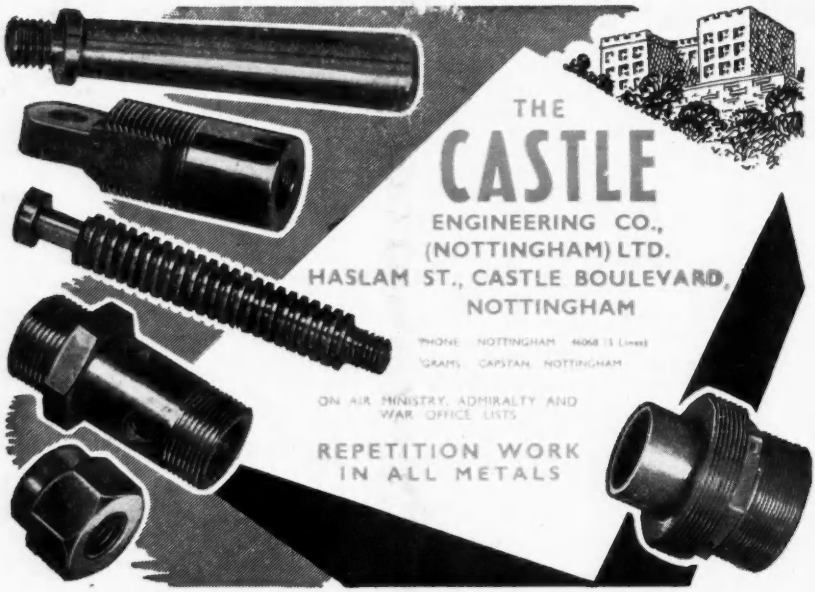

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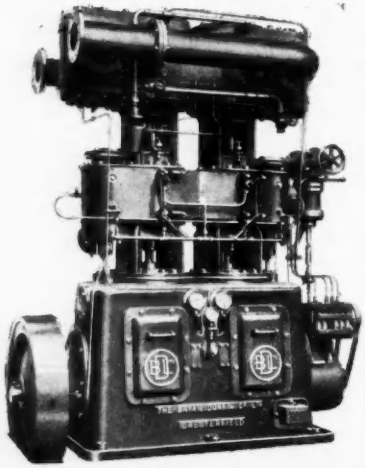

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